
Birkbeck
UNIVERSITY OF LONDON
BabyLab &
ToddlerLab
BABYLAB &
TODDLERLAB
NEWSLETTER
2023

THE BIRKBECK BABYLAB & TODDLERLAB WOULD LIKE TO THANK ALL OF THE FUNDERS WHO HAVE SUPPORTED US IN OUR RESEARCH

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ONLINE RESEARCH

Innovation is key to research at the BabyLab & ToddlerLab. In addition to our lab-based research, we have online research for families to take part in from the comfort of home. Please check out our latest offerings cbcd.bbk.ac.uk/online-studies

TESTING METHODS

EEG
(electroencephalography) measures the naturally occurring electrical activity that is produced when brain cells communicate with one another.

EMG
(electromyography) uses skin sensors to record the electrical activity naturally produced by muscle movements.

EYE TRACKING
uses an infrared light source to measure the reflection of light on the pupil. The data gained will determine the rotation of the eye and the direction of gaze so we know exactly where the baby or child was looking.

MOTION TRACKING
originates from sports science and uses cameras that record infrared light to locate exactly where a reflective marker is in space. This allows us to analyse the movement of reflective markers on hands or other body parts in relation to action and specific tasks.

fMRI
(functional magnetic resonance imaging) uses MRI technology to measure brain activity; by detecting changes in blood flow within the brain, fMRI enables us to see which areas of the brain are active.

MRI
(magnetic resonance imaging) uses magnetic fields and radio waves to produce detailed images of structures in the body, such as the brain.

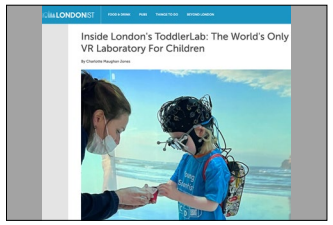
NIRS
(near infrared spectroscopy) uses infrared light-absorption to measure blood-oxygen levels in specific regions of the brain.

CAVE
(cave automatic virtual environment) is an immersive virtual reality environment where projectors direct images at walls and floor of a room size cube.

MEDIA STORIES

The BabyLab & ToddlerLab have been featured in a variety of news articles

SCAN QR FOR ALL NEWS STORIES

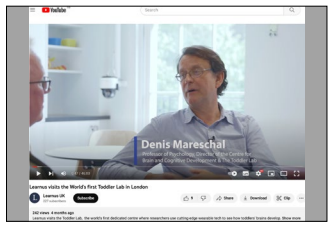


THE WORLD'S ONLY VR LABORATORY FOR CHILDREN

The ToddlerLab recently had a visit from a reporter for The Londonist - an online publication aimed at Londoners – who wrote a parent-friendly article describing our work with toddlers.

KIDS' TV: THE SURPRISING STORY

CBCD Phd student Claire Essex and Professor Tim Smith were filmed at the BabyLab for Konnie Huq's new BBC One TV show "Kids' TV: The Surprising Story". Full episode available on iPlayer, look out for Claire and Tim at 9'10" in!

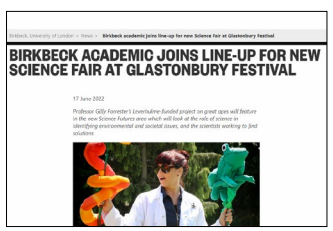


LEARNUS VISITS THE WORLD'S FIRST TODDLER LAB IN LONDON

The ToddlerLab was pleased to showcase our new research labs and facilities with a visit from Learnus, a charity specialising in bringing research innovations in neuroscience to educators. They created a video so you can learn more about why we created the ToddlerLab and what we hope to achieve as explained by our director, Denis Mareschal.

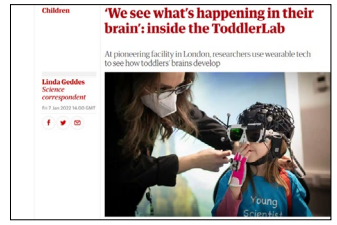
BRAIN ACTIVITY REVEALS AUTISM SUB-GROUPS

Professor Emily Jones' flagship research into Autism was featured in Autism Eye.



CBCD RESEARCH AT GLASTONBURY!

Professor Gillian Forrester, taking the aim of public engagement to the max, showcased her research on great apes and the development of language in humans Glastonbury's 'Science Futures' area. This gives festival-goers insight into the role of science in identifying environmental and societal issues as well as the scientists working to find solutions.

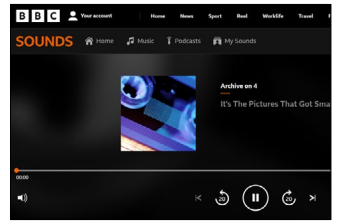


'WE SEE WHAT'S HAPPENING IN THEIR BRAIN': INSIDE THE TODDLERLAB

In this Guardian article you can read about how we are harnessing cutting edge wearable tech to investigate development through toddlerhood and beyond.

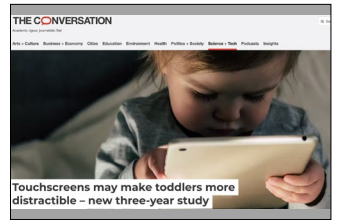
A NEW KIND OF BRAIN SCAN IS LETTING US UNDERSTAND HOW TODDLERS THINK

The ToddlerLab was featured in The New Scientist with both a video of their visit to our labs and accompanying article. Watch and read to see how we are utilising technological advances to understand what is going on in the minds of young children.



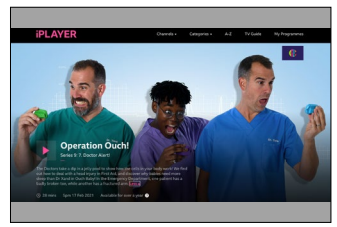
BBC RADIO 4'S "ARCHIVE ON 4" IT'S THE PICTURES THAT GOT SMALLER

Listen to CBCD Professor Tim Smith chat to film critic Robbie Collin about how our brains process and react to films of varying format, from Tik Tok to wide screen.



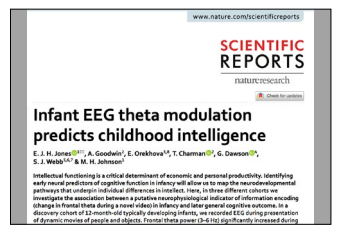
DO TOUCHSCREENS MAKE TODDLERS MORE DISTRACTIBLE?

Professor Tim Smith led a study, the TABLET project, finding toddlers who use touchscreens are more easily distractible. The research was featured in the Daily Mail and The Conversation. CBCD researcher Dr Ana Portugal was featured in a Verywell Family article discussing the study findings



CBBC'S 'OPERATION OUCH! DOCTOR ALERT!'

The Birkbeck BabyLab featured in the CBBC's award-winning children's television series 'Operation Ouch!'. The episode showcased current cutting-edge research Louisa Gossé is conducting at the BabyLab, examining what happens in babies' brains during sleep.



INFANT BRAIN ACTIVITY PREDICTS COGNITIVE ABILITY LATER IN LIFE

The journal 'Nature' published research by Professor Emily Jones with findings from the STAARS study linking infant brain activity to childhood intelligence. Where there are concerns, this would enable interventions to be made earlier, leading to better outcomes in later life.

EVENTS

‘ASK THE SCIENTIST’ ROUNDTABLES & PODCAST

Do you have questions about things like screen time, your child’s sleep or their development? Parents today are continuously presented with information about child development on social media apps. Much of the presented information is not evidence-based and not tailored to the specific interests of parents.

Our goal is to provide parents with a platform to learn about current scientific research on child development and for parents to provide scientists with input as to what research is most meaningful to them. We aim to bring parents and researchers together in an informal setting to talk all things science and child development!

These events are organised by CBCD researchers Dr Maheen Siddiqui and Dr Louisa Gossé. They even did their PhDs in our labs!

Check out our webpage for info about upcoming events and podcasts!
cbcd.bbk.ac.uk/events/askthescientist

GRAND OPENING OF THE TODDLERLAB!

In May 2022, our custom-designed five-storey ToddlerLab was officially opened by the Lord Mayor of London. After many years of planning and building work, not to mention pandemic-related delays, the Wohl Wolfson ToddlerLab is open and ready to showcase our innovative research with babies, toddlers and children!

With rebranding complete, we are now known to our participant families as the Birkbeck BabyLab & ToddlerLab. Although we have two separate buildings for our labs, we are the same research centre. Families already signed up to our participant database will be invited to take part in our groundbreaking research in either the BabyLab or ToddlerLab. If you’re not signed up with us and would like your baby or child to be one of our truly impressive Infant and Toddler Scientists, please get in touch!

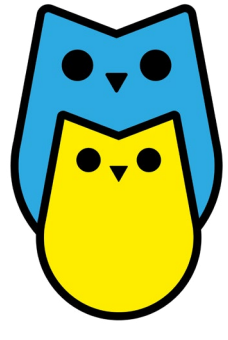
standard.co.uk/news/london/toddlerlab-opens-study-toddlers-brain-disorders-autism-adhd-b1003365.html

OUR NEW ARRIVALS

We would like to welcome the newest additions to the CBCD, recently born to our members. Congratulations!

Postdoc Maheen now has two helpers, an infant scientist and a young scientist, taking part in multiple studies and putting smiles on everyone’s faces!

PhD student Aislinn and her daughter visit the labs for the first time!



STUDIES

GBASIS: LINKING DNA TO INFANTS' BRAIN ACTIVITY WHEN SEEING FACES

Anna Gui, Emma Meaburn, Emily Jones and Mark Johnson

Family trees drawn by some of our wonderful gBASIS participants. Thank you so much for your contribution to our research!

Our latest gBASIS (British Autism Study of Infant Siblings - Genome) study, published in the leading journal JAMA Pediatrics, involved linking the DNA code and using non-invasive sensors to measure the speed of brain responses to faces in 6- to 10-month-old infants with and without a family history of autism. **Infants with more of the genetic differences related to autism were found to respond to faces differently, even at this very young age, before signs of autism might be noticeable.**

This suggests that one way that genetics can lead to features of autism in infants is by altering brain responses to social information. Of note, the genetic differences we are looking at are also commonly found in neurotypical individuals and cannot be used as a genetic test for autism. Our research is a first step towards understanding whether differences in how we make sense of the social world is partly written in our DNA.

Learn more about us here: www.staars.org/gbasis

STUDIES

STAARS: RETURN OF THE TODDLERS?!

Emily Jones, Jannath Begum Ali, Chloe Taylor, Rebecca Holman, Louisa Gossé and the STAARS Team

The STAARS (Studying Autism and ADHD Risks) study is a subset of the BASIS project and aims to identify early markers in the development of Autism and/or ADHD. By understanding more about the mechanisms of these neurodevelopmental disorders, we hope to develop more effective early interventions. To do this, we recruit participants who have parents or siblings with a diagnosis of either ASD and/or ADHD and those infants with no family history of the disorders. We see the infants at 1-, 5-, 10- and 14-months-old with follow up toddler visits at 2- and 3-years; this allows us to see how they grow and develop over the first few years of life.

Now the ToddlerLab is open, the STAARS Babylab team are running the 2-year toddler visits, previously based at Kings College campus. This is a whole new challenge for the testing team! As parents know, toddlers have a mind of their own, so the team works tirelessly to make the day as engaging as possible. Our toddlers watch colourful videos and animations allowing us to record where they are looking using an eye tracker. They then try out our EEG, a net made up of small sponge sensors that measure naturally occurring brain activity - this is often where snacks come in handy! The rest of the day includes play tasks; we see how they play on their own, with their parent and with us.

For our new sleep EEG protocol, some of our youngest infants visit the BabyLab for a few hours to teach us more about how their brain waves change during sleep. During their sleep, we also look at how the brain responds to tactile stimuli, by placing small vibrating sensors on their hands, and auditory stimuli by playing them different sounds through headphones.

STAARS data has contributed to many scientific papers, one of the most recent looked at the differences in infant sleep in those with and without a family history of ASD and/or ADHD. The study also looked at how sleep in infancy might relate to later development in early childhood. We found that infants with a family history of ASD demonstrated reduced night time sleep from as early as 5-months. By 14-months, night sleep was associated with later social functioning and cognitive abilities as well as ASD traits at 3-years, leading researchers to conclude **interventions which target improving infant sleep might be beneficial to this population.**

Thank you to all the families who have helped with this research to date. We have now seen over 300 infants! To take part or learn more, please email us at staars@bbk.ac.uk or check out our website staars.org

BONDS: PERSONALISED NEUROIMAGING TO STUDY SOCIAL DEVELOPMENT

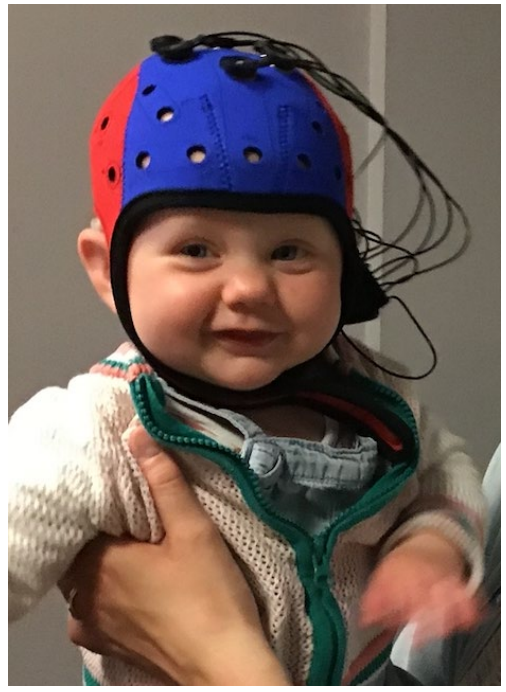
Anna Gui, Elena Throm, Rianne Haartsen, Pedro F. Da Costa and Emily Jones

To date, over 120 baby scientists and their parents have taken part in our study, "Behaviour and Online Neuroimaging to Study the Development of Socialisation" or BONDS for short! The BONDS study combined an innovative artificial intelligence method with non-invasive wearable neuroimaging to understand what is it that produces the strongest brain activation in each of our little participants.

Two of the BONDS experiments have now finished. In one, we tested whether this personalised method allowed us to find out whether the face of their parent, the face of a stranger, or faces that resemble both were more engaging for 5- to 12-month-old babies. The answer is yes! We were able to identify which face image produced the strongest brain response in each individual baby. With a second study, we used the same approach while babies were interacting with the experimenter. Success! Even in more "real life" situations, we could find out what each baby (and their brain) likes about social interactions!

The BONDS team has prepared a few articles to inform the scientific community of the benefits of using personalised approaches in research about development, to keep babies and kids engaged in the task, obtain good data, and produce meaningful results about individual differences in how the brain develops.

A baby scientist wearing the neuroimaging cap used in the BONDS experiments



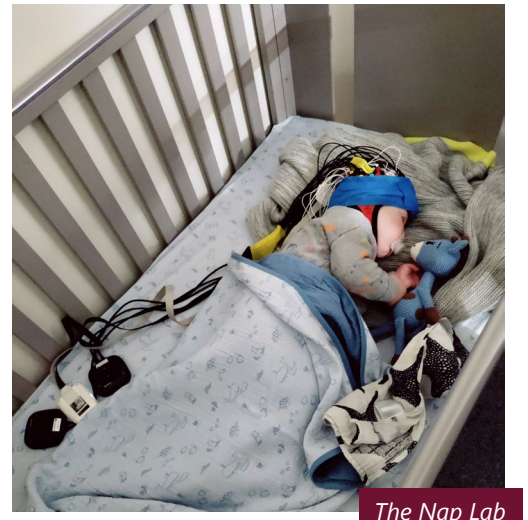
Feel free to take a look at the BONDS website to read our publications: sites.google.com/view/bonds-project

SLEEPY CONNECTIONS – UPDATE ON THE BABYSLEEP STUDY

Louisa Gossé and Emily Jones

Babies spend a large part of their early life asleep, but seemingly never when their parents want them to! The fact that their sleep is so very different from ours is perhaps the best hint that sleep performs an important function in development. Indeed, we know that sleep is key for making new memories, for learning and for processing the events of the day. And who learns more than babies who must learn everything from smiling to walking to talking?!

But each baby's sleep is very different - while one baby might sleep 10 hours, another one might sleep 18 hours. Is there an ideal type of baby sleep for development?



The Nap Lab

At the BabyLab, we conducted a series of studies to understand the relationship between sleep and development. Our initial results show that how long babies sleep for has little impact on behavioural development, as assessed by parent reports and eye-tracking measures. However, sleep quality (how well a baby sleeps) did seem to impact brain measures of development.

This led us to think that we should be studying the brain during sleep. One way to look at sleep quality during sleep is by looking at how the developing brain is forming connections and how different brain regions interact with each other. We developed a comfortable, wireless neuroimaging cap that can measure what happens in the brain while baby is sleeping in our new ToddlerLab Nap Lab. We have had over 50 babies come and nap with us (of which about 35 actually napped!) and after a Covid-19 related break, we are almost done with our data collection. **Preliminary results show that it might not matter how long a baby sleeps but rather what happens in their brain while they are sleeping.** In the future, we hope to see how we can support a baby getting better quality sleep!

THE DOT STUDY

Liam Collins-Jones, Emily Jones, Louisa Gossé, Chiara Bulgarelli, Maheen Siddiqui and Robert Cooper

The Dot study is exploring new ways to image the baby brain. Due to the limits of technology, in the past, baby brain imaging studies tended to focus on looking at particular areas of the brain rather than looking at how activity in different areas of the brain is linked. Using recent advances in technology, the aim of this study is to get highly precise images of brain activity from across the entire surface of the brain in awake 5- to 7-month old babies.

We are using a technique called diffuse optical tomography, or Dot for short. We have designed new Dot imaging headgear to image the baby brain. Because it covers the whole head of the baby brain, it is known as whole-head Dot imaging.

We show babies different sets of videos: clips of actors singing nursery rhymes and clips of moving toys. Our results show activation in brain areas where we would expect to see activation from previous baby research. Whole-head Dot imaging has also let us explore activation in brain regions which aren't normally imaged in baby studies of social interaction: we have seen interesting patterns of activation in brain regions associated with visual processing and interesting activity in the frontal lobe of the brain. We have also been collecting brain imaging data from babies while watching videos of moving shapes to investigate what researchers call resting-state brain activity, which we will start to analyse soon.

This study exemplifies the power of teamwork! It's a collaboration between neuroscientists and psychologists at the CBCD; physicists and engineers at University College London (UCL); and Gowerlabs, a company specialising in design and manufacture of brain imaging devices.

INFO VALUE: CAN INFANTS PREDICT WHERE TO FIND INFORMATION?

THE INTERNATIONAL PROJECT

Tommaso Ghilardi, Giulia Serino, Francesco Poli, Chiara Bulgarelli, Marlene Meyer, Olympia Colizoli, Sabine Hunnius and Denis Mareschal

Infants are constantly bombarded with a large number of sensory stimuli from birth, but they are equipped with powerful learning mechanisms that help them make sense of the world. Multiple studies over the years have shown that infants have the ability to identify patterns and regularities from auditory or visual streams, group diverse stimuli into categories, and even organize their knowledge.

In a recent study, we expanded these findings by showing that **infants can predict when a stimulus will give them information or not.** In the study, infants were shown either smooth or pointy shapes moving to a corner of the screen and then a cute puppet was presented. The smooth shapes were considered informative as they indicated where the puppet would appear, while the pointy shapes were not informative. Our results showed that infants can recognize informative shapes, demonstrating that infants can learn and predict which stimuli will give them later information.

Now that we have shown that infants can predict where to find information, we are focusing our research on exploring the neural correlates of this ability. If, as we have shown, infants can predict

upcoming information, we expect them to utilize this information to orient their attention accordingly, and this will activate brain areas that are involved in attention control and orientation. In the current study we are conducting, we are using fNIRS - a safe and non-invasive technique - to measure infants' brain activity while they watch informative and uninformative shapes as in the previous experiment. This study will then connect and expand our previous findings by showing that not only can infants predict upcoming information, but that this prediction influences the activity of areas that are linked to attention.

The study is currently ongoing. Stay tuned if you want to hear more about how infants can learn to be efficient in their learning!

If you know a baby scientist between 7.5 and 8.5 months of age that would like to take part, please send us an email: babylab@bbk.ac.uk

LET'S GET DISTRACTED: A STUDY OF ATTENTION DEVELOPMENT

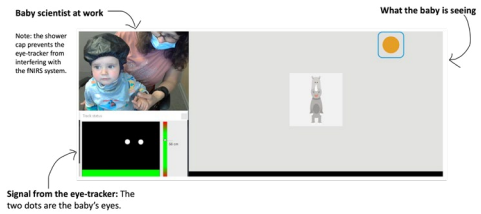
THE INTERNATIONAL PROJECT

Giulia Serino, Paola Pinti, Denis Mareschal and Natasha Kirkham

The concept of distraction is often synonymous with poor attention abilities. However, adaptive behaviour requires a person to be able to respond to important information presented outside the current focus of attention. For example, if we are reading a book on the bus and someone says our name, we immediately look up and are distracted from the book. This is not due to any physical property of our name compared to the background noise, but to its intrinsic value stored in our memory.

Babies come into the world with very little knowledge and every day they are exposed to more information than their brains can process. How do they select the important information in the environment? **Can babies discriminate between informative and uninformative distractors?** If yes, how does the brain support this process? We used a combination of eye-tracking and fNIRS methods to answer these questions.

8-month-old infants were shown two shapes: a triangle and a circle. They learned that the triangle (the informative distractor) was followed by a video of a person speaking, whereas the circle (the uninformative distractor) did not predict anything. After this learning phase, while video clips of a cartoon hippo dancing were played in the middle of the screen, the two shapes appeared on the edge of the screen as distractors.



Our preliminary eye-tracking data suggest that infants can take advantage of previous experience to select the relevant information in the environment. While watching the video clips, they were more distracted by the informative distractors (the shape previously associated with the person speaking) than the uninformative ones.

We need to collect more data to share our fNIRS findings with you! **If you know a baby scientist between 7.5 and 8.5 months of age that would like to take part, please send an email to babylab@bbk.ac.uk**

fNIRS, functional near infrared light spectroscopy, safely measures the naturally occurring activity of the human brain by measuring changes in the amount of oxygen in the blood supply to the brain. fNIRS shines weak rays of light into the head and measures the colour of the light reflected back. If your brain is using lots of oxygen and it is busy responding to something, your blood will be red like your arteries. If your blood has less oxygen, it will have a bluer colour like your veins. By measuring these colour changes we can see which parts of the brain are active. The fibres that carry the light to the head and back are part of a small, comfortable hat, making fNIRS a brilliant technique for studying the brains of babies and children.

EMOTIONAL FACES

THE INTERNATIONAL PROJECT

Mitsuhiko Ishikawa and Tim J. Smith

Humans pay attention to what we want to look at. Infants also look longer at the visual stimulus they prefer. But it's not just about preference, humans also need to pay attention to potential threats for survival reasons. This bias towards potential threats has been reported in infants, suggesting that infants are more likely to look towards negative stimulus rather than positive stimulus. How is infant looking behaviour affected by positive or negative emotional stimuli? We investigated the effects of facial expressions on two different looking behaviours in infants: anticipatory-looking and preferential-looking.

We invited 7.5- to 8.5-month-old infants to take part in our eye-tracking study where we showed them different combinations of happy, neutral and angry faces. During the study, infants were able to learn the position on screen where each facial expression was presented. We measured infants' anticipatory-looking behaviour to each emotional face and total looking duration at each emotional face.

Anticipatory Looking

Preferential Looking

For total looking duration, we found that infants looked at the happy and angry faces more than the neutral face. When the happy and angry faces were presented, infants looked at both faces equally. In the anticipatory-looking test, infants looked to the position of the happy face and avoided looking to the position of the angry face.

This study shows that both the happy and angry faces grab visual attention in infants compared to neutral faces. On the other hand, when infants can anticipate the position of emotional faces, infants look to the position of the happy face.

Based on these results, it is likely that 8-month-old infants decide where to look based on the value of visual stimuli. Infants' looking behaviour is not random and is modulated in response to the external environment.

LANGUAGE AND FACES

Ricarda Brieke, Lasana Harris, Makeba Wilbourn and Natasha Kirkham

"Perceptual narrowing" is something that happens naturally over time. We start out at the beginning of life being able to hear and see lots of subtle differences between sounds and faces, but as we grow, we start to only notice things than are familiar in our environment. For example, very young babies are really good at recognising faces from lots of different races and ethnicities, but as they get older, they become better at recognising faces from their own race than from others. This is called the Other Race Effect and older infants, children and adults all show it. Similarly, monolingual babies can pick up and recognise sounds from lots of different languages, but as they get older, they focus more and more on their own language. We wondered if bilingual babies (who show less perceptual narrowing in language than monolingual babies) would maybe show less of the Other Race Effect too!

To answer this question, we showed 9-month-old monolingual and bilingual babies a face recognition task, using pictures of Caucasian and Asian faces. Babies were eye-tracked while familiarised to a set of faces and then they were shown either a familiar face or a new face. Babies who have learnt to recognise the faces will show a "novelty preference," which means they will look longer at a new face.

Our results showed that bilingual babies were better at recognising faces from both the Caucasian faces and the Asian faces. They did not show the Other Race Effect. The monolingual babies, however, did not seem to learn either face group very well. We are continuing this work to see why these differences exist.

A special thanks to all the families and babies who participated in this study!

LANGUAGE EXPERIENCES AND PERCEPTION STUDY (LEAP)

Victoria Mousley, Evelyne Mercure and Mairéad MacSweeney

Last year, we completed the LEAP study which aimed to understand how early language experience affects language and cognitive development. We tested whether learning two languages from birth, called 'simultaneous bilingualism', was related to differences in how toddlers perceive social things in the world. Specifically, we looked at whether bilinguals, compared to monolinguals, showed differences in attending to foreign language sounds, still faces and moving faces.

The first task was about listening to different sounds from an unfamiliar language. All children seemed to listen to the sounds similarly to each other regardless of their early language experiences. Previous research indicates that bilingual children's brains might be responding differently to these sounds than monolingual children, but it doesn't seem that their behaviour differs from each other.

We also showed children images of faces, cars, phones, 'noisy faces' and birds. We found that all children looked at faces faster than any of the other areas on the screen. However, bilinguals looked at faces slightly faster than monolinguals. We think this may be because early experience with two languages boosts a child's sensitivity to social information in their environments.

In our final task, we were interested in how children look to mouths of people talking. We found that monolinguals and bilinguals looked to mouths for the same amount of time overall, but that bilinguals seemed to linger slightly longer on average per look to the mouth. We think this may be because bilinguals have twice as many language sounds to learn as monolinguals, so they may pay a little more attention to people's mouths to help them learn their two languages.

While these results are interesting, we know that children don't typically interact with the world viewing a TV screen in a dark room. Our next study will look at children's interactions with others in naturalistic environments.

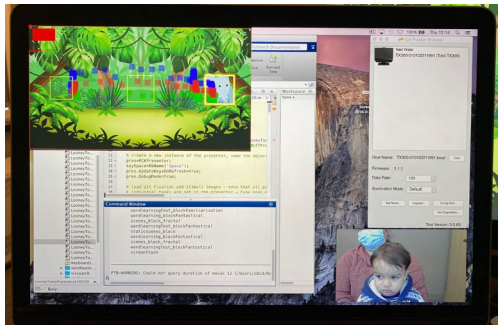
Victoria's new project at the ToddlerLab investigates how pre-schoolers learn using lots of fun wearable technology.

If you have a four- to six-year-old who would like to visit the lab and play games, please get in touch! babylab@bbk.ac.uk

THE LOONEY TOONS STUDY: FANTASTICAL KIDS TV – ENCHANTING OR BEWILDERING?

Claire Essex, Teodora Gliga, Rachael Bedford, Nicholas Walters and Tim J Smith

Kid's cartoons often include weird breaks with reality (Road Runner's casual regard for the laws of physics, SpongeBob SquarePants… everything!) that are believed to entertain children and provide an opportunity for learning. But are these fantastical moments too much for the developing brain to process? In this study we used an eye-tracker to measure where children look while they view specially edited Looney Tunes cartoons and complete tasks designed to investigate how they control their attention and learn from screens. We also asked families about their children's screen time and the TV shows they like to watch.



We want to know if there is a short-term impact of viewing fantastical cartoons on children's developing attention skills. If so, what happens when children then try to learn new information such as novel words? Can a short-term impact be explained by the fantastical events alone or are there other factors involved such as story complexity or visual changes (for example, camera angles, brightness, colour etc)? Thank you to all the families who were involved. Although we aren't quite ready to share results from the study yet, we do have something for you!

We are also interested in how kid's TV show content features (for example, camera edits, pace, motion, image complexity) differ. We found shows which reduce children's executive function skills after viewing tend to have more motion, more complex images, and more cognitively fatiguing jumps in time and space.

This suggests those properties may be central to understanding why some TV shows appear to have more impact on children's attention skills than others.

This study is part of a wider ESRC funded industrial challenges PhD project in partnership with children's media platform Hopster. The broader project seeks to examine the dynamics of attention in response to media presented on digital devices. We are interested in how aspects of the content (editing techniques such as pace) and different types of interaction (video viewing, educational games) may influence the allocation of attention and a child's ability to comprehend and learn from the content.

THE BEDTIME BOOST STUDY

Hannah Pickard, Claire Essex, Emily Goddard, Petrina Chu, Ben Carter, Rachael Bedford and Tim J Smith

In the first few years of life, infants' sleep patterns change substantially. During this time, we often see an increase in night-time sleep together with a decrease in day-time sleep. A good night's sleep is important for child development and can help children develop the ability to focus their attention; a skill which becomes very important in early school years. It is thought that certain bedtime activities such as having a bath, quiet play, reading and dimming lights help calm infants and get their bodies ready for sleep. Our Bedtime Boost Study aims to look at the impact of using certain bedtime activities on infant sleep and attention. Our long-term goal is to better understand how we can help improve sleep and support the development of attention in infants.

Families who are selected to take part in our Bedtime Boost study may be asked to try out some bedtime activities recommended by sleep experts with their child in the hour before bed. They will also be asked to tell us about their child's sleep and bedtime activities and visit us at the BabyLab so their child can play some games with our research team! All families who complete our study will receive a voucher, a personalised report of their child's sleep, and some toys and thank you gifts.

If you would like to learn more, please visit our website: cbcd.bbk.ac.uk/babylab/bedtime-boost-study

THE EMPATHY PROJECT

Chiara Bulgarelli, Paola Pinti and Emily Jones

Your child's best friend has just broken their favourite teddy and they start crying. Your child stares at them with a very sad face. Your little one is likely experiencing what in psychology we call "empathy" - understanding and sharing someone else's emotional state. While we know that this skill is fundamental for social interactions, how and when it develops is still unclear. By understanding this better and what factors promote the development of empathy, we can help foster these skills in children who have difficulties in social interactions.

Toddlerhood is a crucial age to study empathy. From age two, toddlers are able to understand whether emotions come from themselves or from others. By age three, most toddlers have daily interactions with other peers at nursery or at the playground.

Our team visited a nursery class to closely explore how toddlers interact with each other in real life, and how they react when a classmate shows some distress. We found that quite often, toddlers were staring at a classmate crying. We believe this could reflect personal distress (a more affective side of empathy) but could also be an attempt to understand why the other child cries (a more cognitive side of empathy). To help disentangle what is happening inside a toddlers' brain when they see a friend crying, the second part of our project will be carried out in the ToddlerLab.

Using our new innovative immersive virtual reality set-up (CAVE Lab), toddlers can have fun while they explore a virtual playground or classroom and play with toddler-like avatars. While playing in the CAVE, we will record their brain activity in response to emotionally salient events using fully wearable, child-friendly equipment called functional near-infrared spectroscopy (fNIRS).

We are looking for 3- to 5-year-olds happy to play in our CAVE and help us to understand how empathy develops. Please contact the BabyLab or Chiara directly (c.bulgarelli@bbk.ac.uk) if you would like to participate!

ENVIRONMENTAL NOISE AND ATTENTION

Brittney Chere, Allison Haack, Giulia Serino, Robyn Baldwin and Natasha Kirkham

How do children adapt to different levels of in-home noise and how does this affect their development? To answer this question, we ran two studies with infants and adolescents. Our study with infants measured families' in-home noise levels and tested infants in the lab to see how their attention was affected by listening to different types of background noise recordings while performing an eye tracking task. We discovered that the attention of infants coming from quieter homes was aided by helpful noise recordings and hindered by distracting noise recordings, while those infants from noisier homes blocked out both the helpful and hindering noise recordings. This shows how infants can adapt to different environments and nicely highlights both the strengths and difficulties that come with that.

Our study with adolescents showed that those aged 15-18 performed significantly better than their peers aged 11-14 on an inhibitory control task, but when considering if the adolescents came from a quieter or noisier home, this story changed. Interestingly, we found that the older adolescents from noisier homes lost this advantage and did not perform significantly better than their younger peers. Furthermore, those aged 11-14 coming from noisier homes performed significantly worse than their same aged peers from quieter homes. Surprisingly though, the background noise recording that played at the same time as the task did not affect anyone's performance.

Overall, it seems that long-term exposure to in-home noise may have negative consequences on inhibitory control.

A huge thank you to all our participants, young and old, for taking part in this study!

HAVE YOU SEEN AMY THE MONKEY?

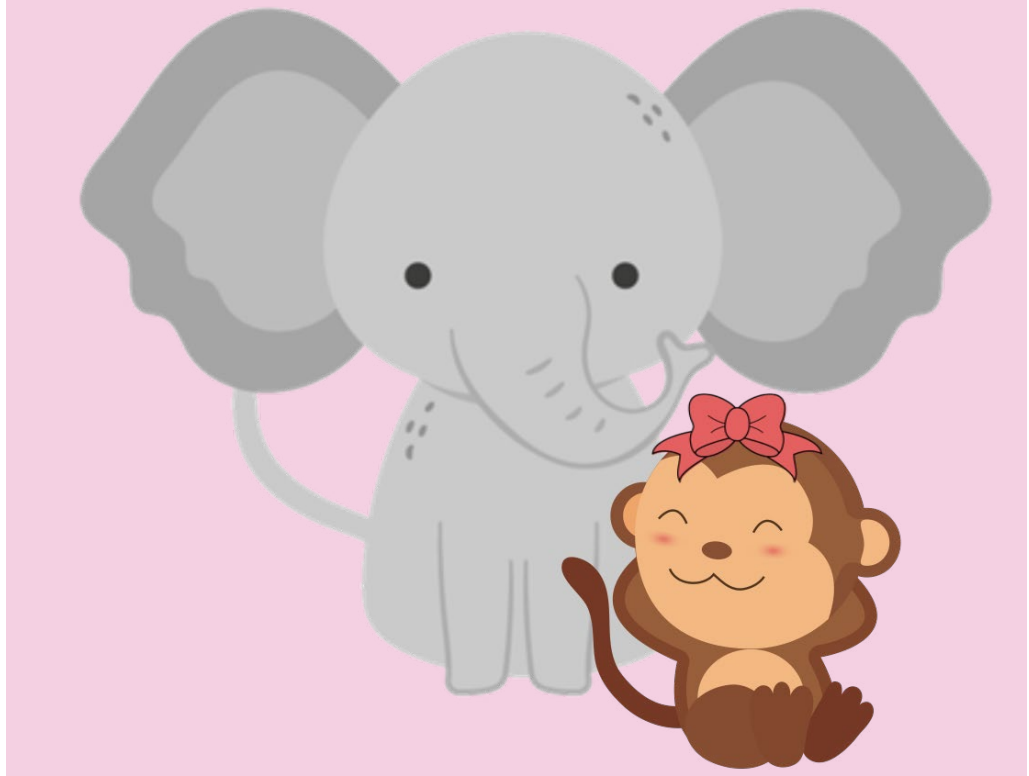
Giulia Serino, Denis Mareschal, Gaia Scerif and Natasha Kirkham

The world is filled with patterns of regularities. We use these regularities to guide our behaviour and navigate the environment. For example, we learn how products are organised at the supermarket and we become faster at finding them. But when does this ability develop?

To answer this question, we asked 3-to-5-year-old children to help Ellie the elephant find Amy the monkey. Children were presented with pictures of bushes and asked to guess behind which bush Amy was hiding. Unknown to the children, the colour and/or position of the bushes indicated the position of the monkey.

Our results showed that 3- and 4-year-olds could take advantage either of the colour or the bush location to find the hiding monkey. However, if both cues were presented, they favoured one over the other. In contrast, by 5 years of age, children naturally started to integrate both cues to find the monkey. Our findings highlight that sensitivity to contextual knowledge develops over time, according to the constraints originating from the developing memory and attention systems, and their interaction with the environment.

A special thanks to all the children, families, and schools who participated in this study!



BOB THE DOG GOES TO SPACE!

Giulia Serino, Lisanne Schröer, Hannah Clancy, Gaia Scerif, Denis Mareschal and Natasha Kirkham

Our project is looking to understand young children's ability to block out irrelevant distractors. As the world is filled with noise, children must learn what stimuli are relevant to their goals and what should be ignored. To study this and to allow for data collection with toddlers, we have developed a multicamera optical motion capture (MoCap) set-up.

During the study, 3-year-old children look for a cartoon dog that is hiding in space. To succeed in the mission, they are given a "lightsaber" and an "astronaut's helmet", a cap made with six optical markers to capture head movements. Unknown to the children, some of the video and audio stimuli located throughout the space-themed room cue the correct location of Bob the dog.

Will children be able to spot the informative cues and disregard the irrelevant ones? Giulia and Lisanne are analysing the data and will share our findings with you in the next newsletter!

We hope that the combination of behavioural and movement measures will provide key insights into the development of children's attention and their ability to block out irrelevant distractors.

Motion Tracking or Motion Capture (mocap for short), is exciting technology using specialist cameras that record infrared light to locate exactly where a reflective marker is in space. By putting reflective markers on a person's body, movement can be identified and recorded in real time. This allows us to analyse the position of reflective markers on hands or other body parts in relation to action and specific tasks.

INHIBITING REALITY STUDY

Larisa Dinu, Paola Pinti, Ilias Tachtsidis and Tim J Smith

Inhibitory control is the ability to suppress or delay responses with the intention of achieving a goal. Inhibitory control is one of our core executive functions which emerges in the first years of life and continues to develop throughout childhood and late adolescence. It is essential in our day-to-day lives, but it is hard to study! To overcome this, we are developing a new ecologically valid platform to assess inhibitory control in our virtual reality lab - the Cave Automatic Virtual Environment (CAVE).

Traditionally, inhibitory control is assessed using questionnaires or computer-based tasks in settings which we describe as artificial (for example, a quiet laboratory). There has been a lack of age-appropriate and ecologically valid tasks for this purpose. To address these limitations, our task takes place in our new CAVE lab - the first of its kind to be used in research with children in the world! Our virtual reality game takes children to a playground, where their task is to pop bubbles of a certain colour that come out of an elephant's trunk, while refraining from catching others. We also use a non-invasive method to understand brain functioning as children play the game with an fNIRS cap, this allows the children to move freely as they would in real life.

We are looking for more 3- to 6-year-olds to take part, pease contact us if your child would like to participate! babylab@bbk.ac.uk

fNIRS HOUSE

Lisanne Schröer, Paola Pinti, Richard Cooper and Denis Mareschal

fNIRS House was the first study to run in the new ToddlerLab! We were interested in brain development when preschoolers execute an action sequence to achieve a key goal. For example, making a delicious sandwich consists of stringing together several actions. While 5-year-olds are able to execute that sequence in the right order, younger children have difficulties with maintaining the key goal in a difficult action sequence. They might lose track of making a sandwich and instead eat the cheese right away!

In our ToddlerLab, we are now able to combine motion capture techniques with wearable fNIRS. This means that children do not need to be connected with cables, but instead are able to move around freely as they would in the outside world.

Using these exciting methods, we found that development of brain regions plays a key role: prefrontal cortex activation in action sequence planning changes over the preschool period.

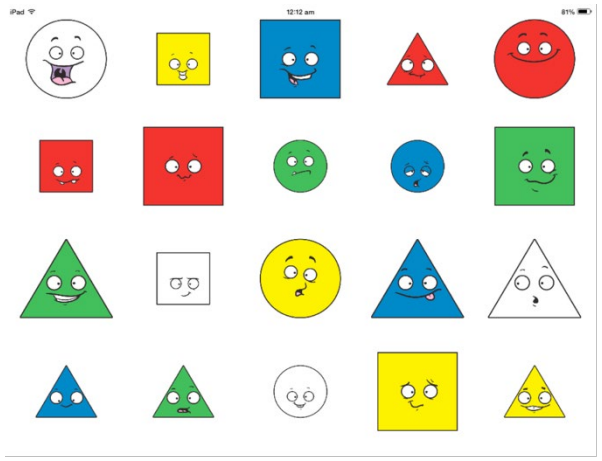
A huge thank you to all the young scientists who have helped make research in the ToddlerLab a huge success!

HOW DOES A CHILD'S ENVIRONMENT SHAPE THEIR SCHOOL-READINESS?

Helen Grimshaw, Denis Mareschal and Natasha Kirkham

Children spend their early years exploring new sights, sounds and sensations, but there is no place more central to a child's development than their home. After all, this is where a growing child spends so much of their time with their family, while acquiring all the basic skills that will carry them through life. It therefore goes without saying that the child's home environment plays an important role in their early cognitive development, and this is what we are investigating!

To do this, we ask 4– to 5-year-olds to play some fun, interactive games on a tablet. These games are designed to measure their basic cognitive skills, otherwise known as 'school-readiness' skills, including working memory and vocabulary. We also ask parents to fill out questionnaires about their home life; we ask about the levels of noise and organisation in the home, as well as their child's sleep quality.



With this information, we hope to gain a better understanding of the complex relationship between a child's home environment and the development of their school-readiness.

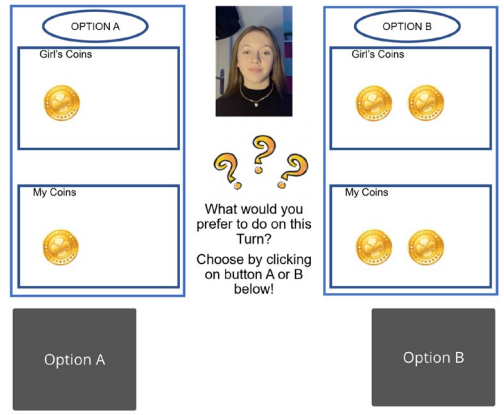
Please contact us if you would like to take part! babylab@bbk.ac.uk

RHYTHM AND SHARING

Judit Sebok-Rose, Natasha Kirkham and Daniel Richardson

When two people move in rhythm together, such as stepping in time, clapping or joining the same dance routine, it is an important marker of social interaction. In fact, research has shown that when adults move together at the same time, they are more likely to be helpful and collaborative. But could such joint movements have the same effect with children? Recent research suggests that movement synchrony can help children be more pro-social, more empathic and more helpful. But can this also help children to be more generous and share with their peers?

To answer this question, we asked 6- to 11-year olds to play a game online with a virtual peer by tapping along with a bouncing ball. They then played a sharing game where they decided how to share out some coins depending on different scenarios.



Which way would you like to share the coins?

For the younger children, we found that it was too hard for them to complete the online task pressing the keyboard button in synchrony with the bouncing ball. However, our results showed that an online social synchrony task with a virtual peer increased generosity and perceived similarity in 11-year-olds when compared to a similar task without the social element. In addition, the type of scenario within the sharing task was important. If there was a chance to be equal (versus generous to the peer), the children were more likely to pick that. In contrast, when the choice meant that the peer would get less than they themselves, the children were more likely to be generous (regardless of condition).

Thank you so much to the families and all the children who participated. We are looking forward to starting our next study in this project!

WHY SO CURIOUS?

Penny Bounia-Mastrogianni, Rick Cooper and Denis Mareschal

As adults, when we have to choose between engaging in a familiar, enjoyable activity or trying a new one, we often stick with the ones we know. In contrast, children will often give up their favourite toy to play with a fascinating new object that has just captured their attention, be it your car keys or a fancy watering pot. They do this even if they are very fond of the original objects! Often, exploring the environment out of curiosity can come at a cost, delaying the accomplishment of a goal. In other situations, exploring is necessary to achieve the best solution. Exploration of the environment also differs: we can search for information we know we miss, or randomly look for new input. But how do different age groups balance their choices when aiming for a certain goal?

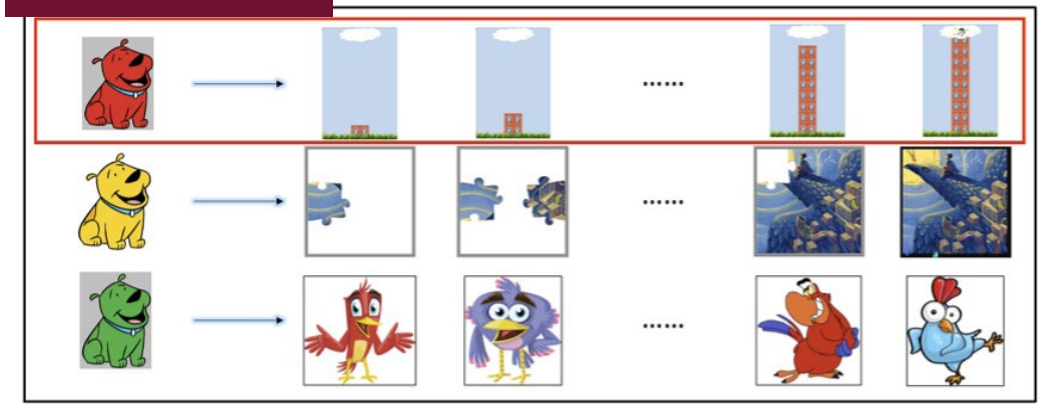
We asked 5- to 9-year-olds, 13- to 16-year-olds and adults to play an online game. They had to choose between three options: to achieve the goal of building a tower and earn the reward, to gradually complete a puzzle and reveal an image, or to reveal new images with every choice.

We recorded and analysed their choices as well as the position of the cursor as they moved the virtual objects on the screen with their mouse. The way the mouse moved gave us information about their ongoing decision-making process: difficulty to choose between options can be seen in their mouse movements, which might deviate more towards alternative options, or slow down before committing to their final choice.

Our findings showed that all age groups found the decision between the two exploratory options harder than choosing between the rewarding option and one of the exploratory ones. This difficulty was shown in their mouse movements, which had larger deviations, thus larger conflicts in this dilemma. The younger children were also shown to decide more based on new stimulation: they wanted to explore new images more than adolescents and adults, who stuck with the rewarding ones, or with revealing information they missed.

We are currently running a new version of this study using different types of rewards with children aged 5- to 7-years-old. If you are interested, please get in touch! babylab@bbk.ac.uk

Example of experimental stimuli for each option



MAGICAL OBJECTS EXPLORATION

Penny Bounia-Mastrogianni, Tommaso Ghilardi, Francesco Poli, Sabine Hunnius and Denis Mareschal

When children explore new items in their environment, they usually look at or touch more the characteristics of these items that can help them gain more knowledge. Children look more at a toy with unusual colours and strange patterns and interact more with a toy with an unexpected surface. But how much new information should an object have to encourage more exploration?

Some studies have shown that children prefer a medium amount of new information compared to things they already know, while others suggest that the most novel objects cause more exploration. This might also vary from child to child. When it comes to new objects, exploration happens with both the eyes and the hands: different object characteristics are accessible with each sense. This means that children might explore in different ways if they use each sense separately, and have different preferences about the objects that they find interesting to explore.

In this study, 4-year-olds were asked to observe and touch different sets of 3D objects hidden behind a panel and inside boxes. The objects were specially designed to vary in complexity. Children were free to explore the objects visually and by touch, and they were also asked to choose their favourite object. They then played short games to measure their proficiency in vision and touch.

We'd like to thank the families that participated in this study! We are now working on the data and will share our findings in the next newsletter!

FROM COMPETITION TO COLLABORATION IN YOUNG GAME PLAY: INSIGHTS FROM KINEMATICS

Maria Paz Cebrecos, Ori Ossmy and Denis Mareschal

Are you competitive or collaborative? Do you think your actions can reveal your intentions? Recent studies show that kinematics (body movement) during collaborative activity can tell a person's hidden cognitive state. In this study, we used motion capture technology to investigate the emergence of motor markers for collaborative and competitive behaviour in 4- to 10-year-old children at the ToddlerLab.

The children played a collaborative reach-to-grasp game with blocks while we recorded their real-time body movements. The results show that the partner's attitude during collaboration influences children's intention to collaborate. This effect was captured in several kinematic features including movement time, wrist velocity and height, and grasp aperture (how wide the hand was opened to grasp the block). Our preliminary findings provide insights into the origins of pro-social behaviour and how they relate to human movement.

Thank you to all the children who played this game!

LEARNING ABOUT OFFSPRING'S UNIQUENESS THROUGH PARENT'S EXPERTISE (LOUPE)

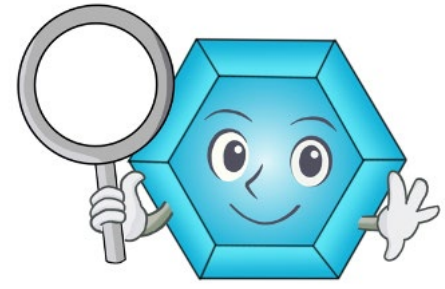
Angelica Ronald, Anja Hollowell, Anna Gui and Morgan Morgan

LOUPE is an online research project looking at how different parent-report questionnaires about infant behaviour compare with each other and to what extent the different questionnaires are measuring the same thing. For example, if a researcher is interested in how emotional babies are, one researcher may ask parents whether "It doesn't take much for your child to become upset and start crying", whereas another researcher might ask "At the end of an exciting day, how often did your baby become tearful?".

We want to know whether these questionnaires that are similar but not the same still agree with one another. That way, we can be more certain that those different studies were measuring the same thing, and we can more easily compare our results.

If you are a parent of a 4 to 40-month-old and would like to help with this, please email Anja (ahollo02@student.bbk.ac.uk) or visit tinyurl.com/bbk-loupe

Our online questionnaire takes just 30 minutes to complete.



What does participating in a study involve?

Generally, our studies take the form of simple games in which we present various interesting things to look at and listen to. In some studies, we show short video clips or cartoons on a computer screen. Other studies are more interactive and involve toys or objects. For example, a researcher might play a game with your baby or child to understand more about how they think and learn different skills. When you arrive at the BabyLab or ToddlerLab to participate in a study, the researcher who is running the study will be there to greet you and explain what the study is about and answer your questions.

Will I be separated from my baby/child?

If you decide to come and visit us, you will be with your baby/child at all times. Your baby will either sit on your lap or in a baby chair. Your child will sit or play independently with you in the same room.

How long do studies take?

The whole visit usually takes about 45-60 minutes, but the studies themselves are quite short, usually 5-15 minutes.

Although I received my welcome email a while ago, I have not been asked to participate in a study. Will I get a call?

Sometimes you will be contacted straight away, other times it may take longer. Each study has an age range and inclusion criteria specific to a particular stage of development. If you have not been contacted, it is not that we have forgotten about you, it is just that your baby or child is not the right age for any of our current studies. Our studies are constantly beginning and ending so new opportunities will arise!

FREQUENTLY ASKED QUESTIONS

How are appointments scheduled?

We will usually phone and email you 1-2 weeks before your baby/child is the right age for one of our studies. Participation in studies at the BabyLab & ToddlerLab is on a voluntary basis, so although you may be asked to come in several times, you can always decline participation in a study. You are of course also free to let us know if you no longer wish to be contacted. We simply invite you to take part in the hope you'll say yes!

What sort of travel arrangements do you provide for families?

We will cover any travel expenses up to £40 when you visit the BabyLab or ToddlerLab. Please keep all receipts or take screenshots. We appreciate families using public transport to reach us, but where this is not possible (and if you live within certain surrounding postcodes) we can provide a taxi service. If you are outside our taxi zone you will need to make your own arrangements. If you choose to drive, we have parking spaces available close by. We will reimburse petrol costs and the congestion charge, though please remember to pay it yourself on the day! We are happy to help you through any additional questions when planning your visit.

You're called the BabyLab & ToddlerLab, but do you test older children?

Yes! We are interested in infant and child development, so our studies range from newborns to school age children and even adolescents. We have something for everyone! Our purpose-built labs were designed to make testing babies, toddlers and children as easy as possible. Our brains develop throughout life, so we strive to study babies and children of all ages!

FREQUENTLY ASKED QUESTIONS

What if my baby or toddler is asleep, hungry or needs changing upon arrival?

Many babies (& toddlers!) fall asleep during their journey to visit us. We try to let the little ones make their own schedule as it helps us have happy participants who will sit through our studies. If a baby (or toddler!) is tired, hungry, or wet, they are unlikely to want to participate. Therefore, we encourage you to carry on with their normal schedule as much as possible, even if it is during a visit. We have changing facilities and you can also feed your baby or toddler in the reception area. Water, tea and coffee are available for parents and carers. However, if you know that your child naps or eats at a certain time, please mention this when booking an appointment.

If my baby or child is ill but we're scheduled to visit for a study, should we still come?

Please don't bring your baby or child to visit us if they or you are ill. Please let us know and we can reschedule your visit. This helps us keep illnesses away from the BabyLab & ToddlerLab. We are flexible!

What if my baby or child does not want to participate on the day?

Don't worry if your baby or child decides they do not want to participate on the day of your appointment. They may be tired, teething, feeling unwell or just find the study too boring! This does not mean that they will always react this way during a study. We will be happy to invite you for future visits for different studies. Babies and toddlers change hour-to-hour, day-to-day and month-to-month so every visit is different and full of new opportunities!

FREQUENTLY ASKED QUESTIONS

What do I get if my baby or child takes part in a study?

We are hugely grateful to all the families who help us with our research! Participation is free. We will refund your travel expenses up to £40. Your baby or child will receive a certificate and thank you gift, usually a BabyLab & ToddlerLab tote bag, t-shirt or toy.

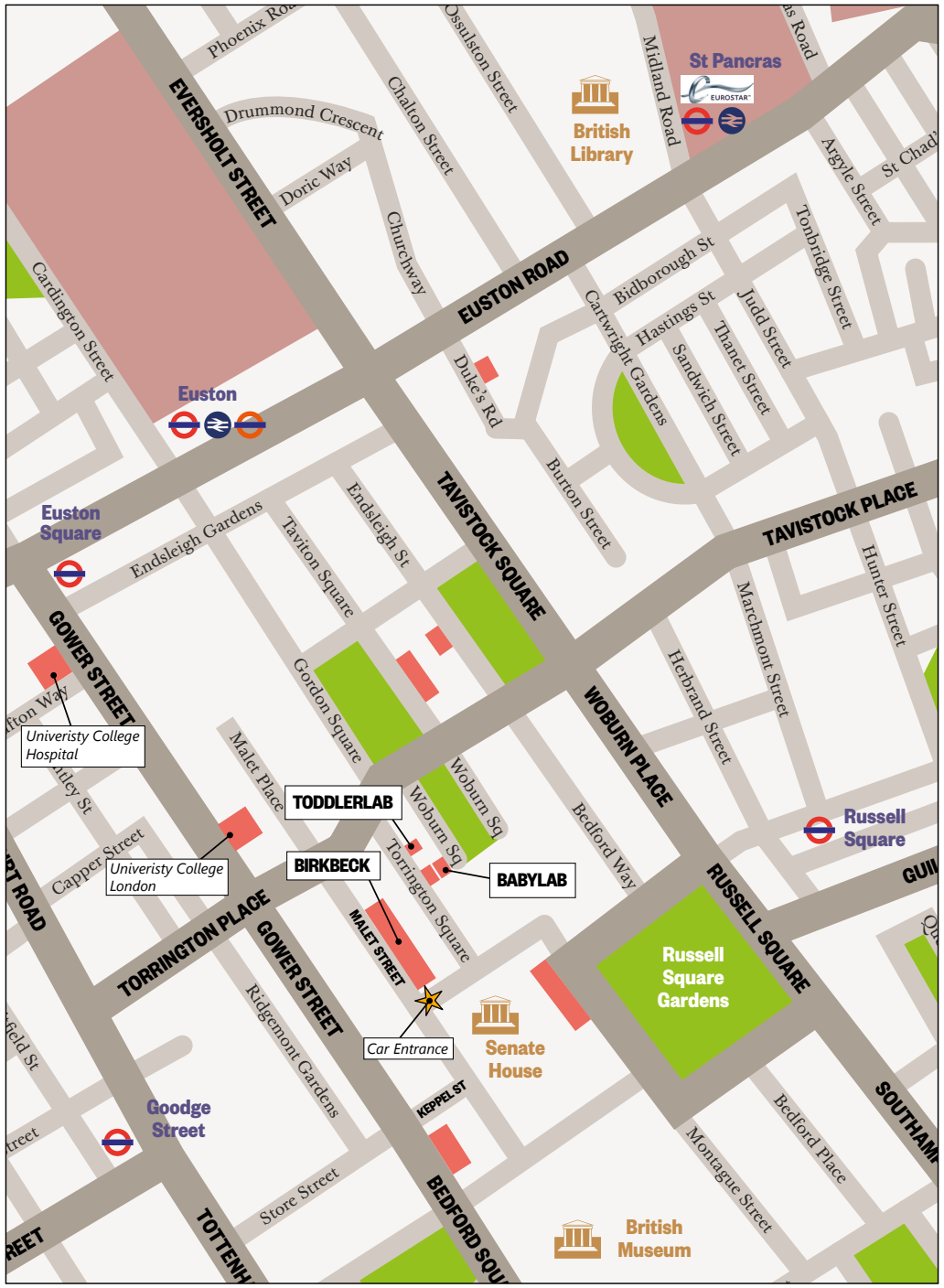
How do you keep my details secure?

We take the protection and storage of your data very seriously. We are extremely grateful to all the parents and volunteers who join our database to take part in our research. Our database is stored on a secure, encrypted, password protected server and meets UK data protection guidance. We will only contact you if your baby/child is eligible for a study or event that may interest you, or to communicate research findings.

If you no longer wish to be a part of our future research and would like to unsubscribe from our database, please let us know and we will delete your details.

Contact us on babylab@bbk.ac.uk or 020 3926 1207.

HOW TO FIND US



HOW TO FIND US

Directions

The *Birkbeck BabyLab* is located in the Henry Wellcome Building, just off Torrington Square, around the corner from the Clore Management Building (on the walking path between Torrington Square and Woburn Square). Signs on either side of the doors read 'The Wolfson Institute for Brain Function and Development' and 'The Henry Wellcome Building'.

The *Birkbeck ToddlerLab* is located a few doors down from the *BabyLab* at 33 Torrington Square.

By public transport

We are within walking distance from the following stations: Russell Square, Goodge Street, Euston, Euston Square, Warren Street, King's Cross and St Pancras.

By car

If driving and using satnav, please input WC1E 7HX which will bring you to the Birkbeck entrance on Malet Street. We have two areas available for parking: Torrington Square and Woburn Square. Torrington Square is accessed via the Birkbeck entrance on Malet Street. Please try Torrington Square first. If no spaces are available, it is then easier to make your way to Woburn Square via the one-way system.

For visits under 2-hours, there is pay for street parking available on Malet Street and other side streets. Parking can be paid by calling the number on the parking signs or with JustPark, quoting the location reference on the sign. Please read signage carefully!

By taxi

BabyLab: Please ask the driver to drop you adjacent to 28 Woburn Square (or if the gate is locked, at the start of Woburn Square). Once at the top of the square turn right and walk up the paved slope. The Henry Wellcome Building is the building on the right. If you have any problems, contact the researcher you booked with.

ToddlerLab: Please ask the driver to take you to the corner of Byng Place and Torrington Square. The *ToddlerLab* is a few doors down on the left. Any issues, please contact the researcher you booked with.

PLEASE JOIN THE BABYLAB & TODDLERLAB OR UPDATE YOUR INFORMATION!

Don't lose touch! If you are moving house or having another baby, please let us know so that we can update our records.

If you have a friend who you think may enjoy a visit to the BabyLab & ToddlerLab, please ask them to contact us too. Babies grow up quickly! **We are constantly in need of babies from 0 - 12 months** and children through school age to help us with our research.

It's easy to sign up online! Just click the 'REGISTER HERE' link on our website: cbcd.bbk.ac.uk/babylab or scan the QR code below

Alternatively, please write to us using the Freepost address:

The BabyLab
FREEPOST RRGX-ARGH-SESR
Centre for Brain & Cognitive Development
The Henry Wellcome Building
Birkbeck, University of London
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