Birkbeck
UNIVERSITY OF LONDON

BABYLAB NEWSLETTER 2018

LONDON'S EVENING UNIVERSITY

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

Action Medical Research and Great Ormond Street Hospital Children's Charity
Autistica
Autour des Williams
Baily Thomas Charitable Fund
BIAL Foundation
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Leverhulme Trust
The Maurice Wohl Charitable Foundation
Medical Research Council
MQ: Transforming Mental Health
Royal Society
Simons Foundation
The Waterloo Foundation
Wellcome Trust
The Wolfson Foundation

TESTING METHODS WE USE AT THE BABYLAB

Behavioural methods include video recording the way a baby or child plays, reacts or interacts within a controlled environment.

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

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

fMRI (functional MRI) 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.

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

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 was looking.

MEDIA STORIES

The Babylab has been featured in a variety of news articles.

THE SECRET WORLD OF BABIES

BBC Future interviewed PhD student Maheen Siddiqui, Reader Natasha Kirkham and Research Fellow Sarah Lloyd-Fox during a visit to the Babylab. Research using fNIRS to study babies' brains could help provide earlier support for infants showing atypical development.

bbc.com/future/story/20180327-the-secret-world-of-babies

TOUCHSCREEN TODDLERS

Several media outlets including the BBC, the *Evening Standard*, the *Daily Telegraph* and the *Hindu* highlight Dr Tim Smith's research investigating links between touchscreen use in toddlers and sleep.

bbc.co.uk/news/health-39588453

AUTISM SCREENING SYSTEM COULD BENEFIT MILLIONS OF INDIAN CHILDREN

The Health Medicine Network reports on the start of a collaborative project involving our researchers, aiming to introduce new low-cost ways of detecting autism in children in India.

healthmedicinet.com/i/autism-screening-system-could-benefit-millions-of-indian-children

NO EVIDENCE TO BACK IDEA OF LEARNING STYLES

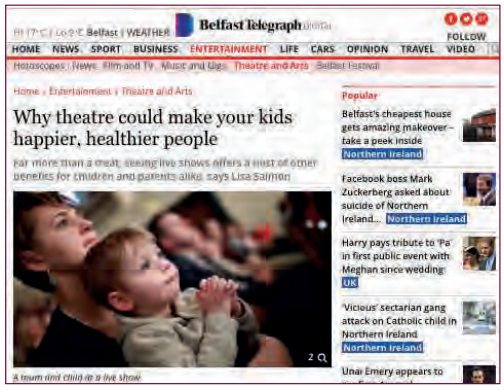
The Guardian published a letter signed by Professor Michael Thomas, about the lack of evidence for learning styles and their use in educational techniques.

theguardian.com/education/2017/mar/12/no-evidence-to-back-idea-of-learning-styles

DO THEATRE VISITS MAKE YOUR KIDS HAPPIER?

Dr Natasha Kirkham explains to *The Belfast Telegraph* how going to see live theatre productions can help aid children's understanding of emotions.

belfasttelegraph.co.uk/entertainment/theatre-arts/why-theatre-could-make-your-kids-happier-healthier-people-36591317.html



SENSE OF SELF IN TODDLERS

BBC Education documented Chiara Bulgarelli's PhD research investigating the development of the sense of self. When do infants develop a sense of self? Does self-recognition in a mirror underlie the moment when a sense of self emerges in toddlers? What are the neural underpinnings of self-recognition? This video reports how research at the Babylab is trying to answer these fundamental questions for infants' development.

bbc.co.uk/news/av/education-42967788/what-s-going-on-in-a-toddler-s-brain

AUTISM DIAGNOSIS LINKED TO LIGHT RESPONSE IN BABIES

Over 140 media outlets across the world picked up on research published in the journal *Nature Communications* by Babylab researchers Teodora Gliga, Mark Johnson and colleagues identifying early predictors of later autism diagnoses.

nature.com/articles/s41467-018-03985-4

huffingtonpost.co.uk/entry/signs-of-autism-babies_uk_5af1530fe4b0ab5c3d693361

UPDATE ON THE TODDLERLAB

We are thrilled to announce that Birkbeck has received a generous donation from Daniel and Elizabeth Peltz to fund the 'CAVE' in the forthcoming Wohl Wolfson ToddlerLab. A 'Cave Automatic Virtual Environment' is an audio-visual immersive virtual reality environment in which you can project images to transport toddlers to different surroundings (e.g. a farmyard, or city street) to see how they react to different programmable scenarios.

Birkbeck scientists will be able to measure brain function and movement in the CAVE, thus making it feasible to complete studies never before possible in a 'naturalistic' but controlled setting while toddlers are moving about.

BIRKBECK CROWDFUNDING CAMPAIGN

Birkbeck's first ever crowdfunding campaign was also a huge success and exceeded its £30,000 target. The campaign raised funds to buy cutting-edge equipment for the ToddlerLab and had support from 260 donors raising a total of £37,871! A huge thank you to everyone who donated. **It's not too late to give** – if you would like to donate towards our ToddlerLab please visit: *bbk.ac.uk/donate/toddlerlab*

Building works are already underway and the funds raised will go towards state-of-the-art equipment and technology for the ToddlerLab. Studying toddlers requires technology that moves with them, for example, wireless or wearable headsets which can monitor their brain activity while they run around and play. The Wohl Wolfson ToddlerLab (below) is scheduled for completion in late 2019.

PROFESSOR ANNETTE KARMILOFF SMITH

Our irreplaceable friend and colleague Annette Karmiloff-Smith passed away on the 19th of December, 2016. Annette was an inspirational scientist and inspirational teacher but above all an inspirational woman. A true pioneer in the study of child development, she touched the lives of many across the world with her writings and teachings.

In March 2018, a symposium was held in her honour. Attended by imminent psychologists from all over the world, the event celebrated her wealth of research and collaborations into developmental cognitive neuroscience over the last four decades.

Recordings of select speakers are available on the CBCD website: cbcd.bbk.ac.uk/node/213

OUR NEW ARRIVALS

We would like to welcome the newest additions to our Centre, recently born to Babylab staff. Congratulations!

SOPHIE (HANNAH)

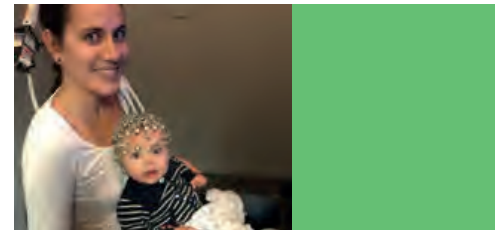
EVELINA (TIM AND RACHAEL)

IVAN (TEEA)

MARTINO (ANNA)

ZANDER (SUZANNE)

JAMES (IROISE)



LÉNA (MARIE)

SAM AND GREG (CLARE)

TODDLER ATTENTIONAL BEHAVIOURS AND LEARNING WITH TOUCHSCREENS (TABLET) PROJECT

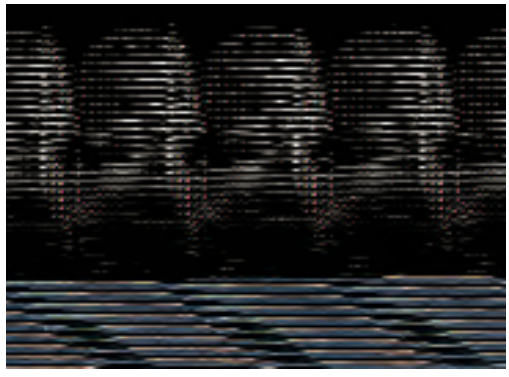
*Tim J Smith, Rachael Bedford, Celeste Cheung, Ana Maria Portugal and Annette Karmiloff-Smith**

How does the use of touchscreen devices affect our little ones? This is a question that has probably crossed the mind of many parents given the sudden increase in touchscreen devices in our lives and the enthusiasm most children show for using them. Increased touchscreen use is a huge change in a child's early environment and as Developmental Scientists it made us wonder how early exposure to such devices might influence the way our children are developing. Currently there is very little scientific research investigating this topic. This project is the first attempt to fill this gap.

In this Leverhulme and Wellcome Trust-funded project we are studying how 6-month to 3-year-old infants are using touchscreen devices and how this use is influencing their cognitive, brain and social development. Families around the world have already participated in the project and contributed to our first published findings on associations between toddler daily touchscreen use and sleep problems as well as age of first active-touchscreen use and fine-motor development.

For further information see media stories or to get involved in the project visit: bbk.ac.uk/tablet_project

**The TABLET project was conceived of and designed with the late, Annette Karmiloff-Smith. Her inspirational contribution is sorely missed.*



BONGO BABIES

Sinead Rocha, Victoria Southgate and Denis Mareschal

This year we had an exciting collaboration with the Polka Theatre, Wimbledon. Polka commissioned a new piece of theatre for infants aged six to eighteen months, inspired by the science we do here at the Babylab. Sinead Rocha, Rosy Edey and Caspar Addyman worked with theatre makers to produce 'Shake, Rattle & Roll', which explored laughter, music and movement.

Babies who came to the performance were also invited to take part in Sinead's study on infant rhythm. Studies with adults have previously shown that our natural rate to move at is related to body size, such that taller adults prefer moving to slower music than shorter adults. A link between body size and rhythmic movement is walking. We were interested in whether a baby's natural rate to move at is related to his or her own size, or whether it might be related to their caregiver's body size, as they receive lots of rhythmic information when being carried around by their caregiver.

We asked babies to drum for us and measured their body size and their caregiver's body size. We found that infants got faster and kept a steadier rhythm, as they got older. We did not find a relationship between infants' own size and their natural rhythm. However, we did find that their tempo was related to their parent's height, such that babies with taller parents drummed more slowly than babies with shorter parents! This was especially true of babies who were not walking on their own yet. **This supports the idea that experience of being carried may influence our natural rhythm.**

CARRY ON DRUMMING

Sinead Rocha, Victoria Southgate and Denis Mareschal

An explanation of the results of our Bongo Babies study is that taller adults have longer strides, and therefore experience longer gaps between steps (or a slower rhythm), and that experience of being carried at their parent's walking tempo influences infants' own tempo.

In this follow up study, we tested this idea directly, by asking the babies to drum before and after experience of being carried by the experimenter at either a faster or slower than normal pace.

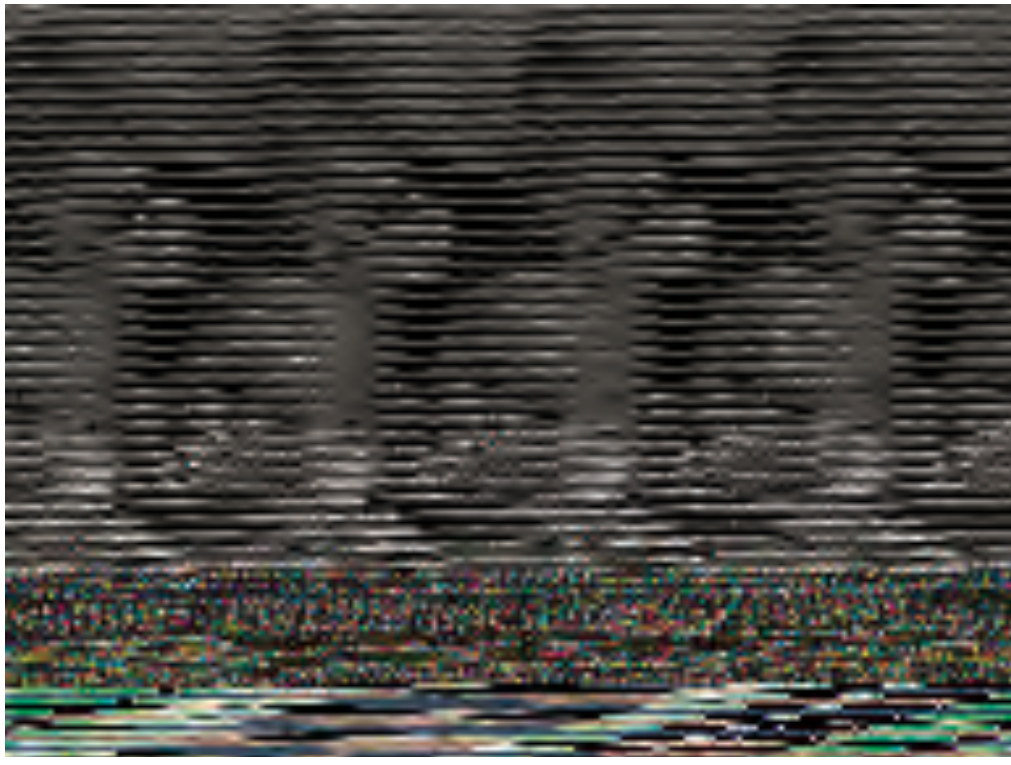
We predicted that in the second round of drumming, infants who were carried at the faster speed would show a faster tempo than those who experienced the slow walking. We found that this was indeed the case, suggesting that the walking pace infants experience when being carried does impact upon their natural rhythm.

CARRY ON LISTENING

Sinead Rocha, Victoria Southgate and Denis Mareschal

We were further interested in whether experience of being carried by a walking adult changes the way that infants respond to a rhythm that they hear. Specifically, we are asked whether infants form connections between the sound of walking and the movement of walking. When they hear an auditory rhythm at the rate at which they were walked, does their brain respond with more 'action' related activity, even though they are just sitting still and listening?

To test this, we carried babies at the faster or slower tempos, then played them metronome recordings at both the fast and slow rates, whilst recording their EEG. We predicted that infants would show more sensorimotor brain activity when they hear the rhythm that they were walked at, than the alternative rhythm. Though we saw the pattern of results that we expected, we were not able to confirm this statistically. More studies will be needed to clarify our results.



THE BASIS GENOME STUDY (GBASIS)

Mark Johnson, Emily Jones, Emma Meaburn and Anna Gui

gBASIS is a large project aiming to understand links between genetics, brain development and autism.

Research has shown that naturally occurring differences in the DNA code of individuals can contribute to the emergence of neurodevelopmental disorders such as autism and ADHD. However, to-date the majority of these research studies have been limited to examining the DNA code of older children or adults. As a result, we currently know very little about how and why these DNA differences affect the brain during development to increase the risk for autism and ADHD. Here at the CBCD we are in a unique position of being able to bridge this gap in our knowledge by looking for these differences in the DNA code in infants, and tracking if, why and when they influence early behaviour, and how this maps on to atypical development.

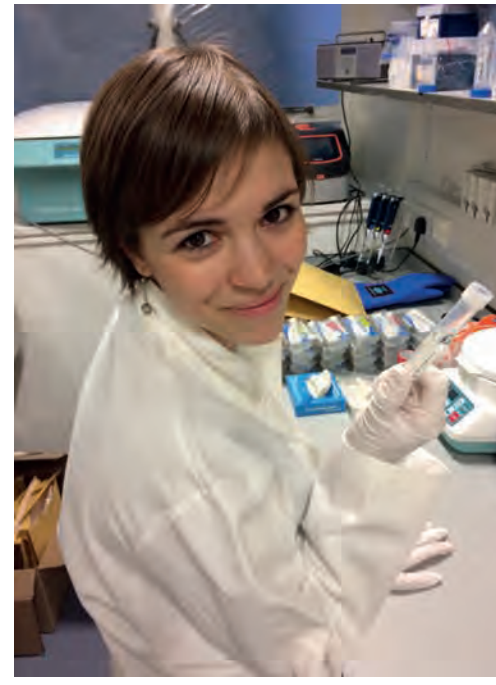
We hope that by gaining insight into the pathways linking DNA, the infant brain and behaviour we will be in a better position to understand factors that might protect at-risk infants and ultimately aid the development of new and effective treatment strategies.

The project is still in its infancy, but has finished collecting saliva samples from families who participate in the BASIS and STAARS studies. The saliva samples are being processed to extract DNA, and the DNA will then be examined using the latest technologies to help us identify these commonly occurring differences in DNA code in infants and their family members. We will then be able to link the DNA information to the measures already collected by the BASIS and STAARS teams.

We hope to be able to share early results with you in the next newsletter.

IF YOU HAVE RECEIVED A DNA KIT FROM US ...

... that is currently gathering dust on your kitchen counter, please do return it – every sample counts!



NIRS MINI-CYRIL

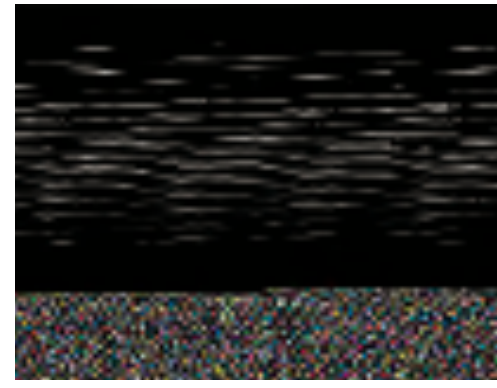
Maheen Siddiqui, Sarah Lloyd-Fox, Emma Meaburn, Clare Elwell and Mark Johnson

NIRS (near infrared spectroscopy) has been successfully used in the Babylab for many years, to explore many different questions about infant brain development. NIRS uses light to measure changes in blood-oxygen levels in specific brain regions and this information can be essential in understanding developmental pathways. Less commonly known, NIRS can also be used to measure the activity of the mitochondria or the "energy factories" inside cells, telling us how energy is being produced and used in specific brain regions.

With this study, we aimed to use this different type of NIRS imaging to measure brain activity in 4-to-6-month-old babies. The babies were presented with social videos containing clips of ladies performing "peek-a-boo" and "incy wincy spider" along with human sounds such as laughter and crying. This was followed by still images of cars and helicopters.

We thought that there would be stronger brain activation to the social videos and we would therefore see greater change in mitochondrial activity. This is because the mitochondria would be working harder to produce energy for the active brain cells. For the first time in infants, we successfully measured mitochondrial activity using NIRS. **Just as we had predicted, there was increased mitochondrial activity during the social videos.**

This is a very exciting result because we have shown that we can obtain this measure, which is a strong marker for brain activity, in healthy, awake infants. This will be very useful in the future for identifying both typical and atypical developmental pathways, such as in autism, where there may be mitochondrial dysfunction.



THE BRIGHT PROJECT: BRAIN IMAGING FOR GLOBAL HEALTH

Bosiljka Milosavljevic, Clare Elwell, Luke Mason, Sarah Lloyd-Fox, Laura Kischkel, Sophie Moore, Maria Rozhko, Samantha Mccann and Anna Blasi

Birkbeck's Gambia project is now well underway in examining social and cognitive development in British and Gambian infants after successfully showing in Phase 1 that cognitive development in low resource areas can be monitored using fNIRS techniques. The BRIGHT project is a longitudinal collaboration of researchers from UCL, Birkbeck, KCL and the MRC Gambia (now part of LSHTM) examining developmental trajectories of babies over the first 1000 days of life. We are using behavioural measures as well as NIRS and EEG to map out developmental trajectories of a large infant cohort. To date, 60 families have been recruited into the study in Cambridge, UK and 180 families in the Gambia.

This project is the first of its kind to longitudinally follow infants and collect data on behaviour, cognition, neural functioning and nutrition and holds potential to impact on the lives of future generations of children, who are at risk of compromised development.

For further information see: globalfnirs.org
Twitter: @bright_project
facebook.com/brightprojectuk

BABY FACE STUDY

Carina de Klerk, Chiara Bulgarelli, Antonia Hamilton and Victoria Southgate

It's a common experience: while talking to a friend or colleague you suddenly realise that you are copying their behaviour or accent. This tendency to spontaneously and unconsciously copy or 'mimic' others' actions serves important social functions, such as increasing liking and affiliation. However, little is known about how mimicry develops. The 'Baby Face' project aims to investigate the development of mimicry by following a group of sixty infants from 4-months until 3-years of age.

Below are some of the findings so far.

EYE CONTACT ENHANCES FACIAL MIMICRY IN 4-MONTH-OLDS

Previous studies have shown that we have a greater tendency to mimic someone when they are looking at us. As eye contact is an important communicative signal that infants are sensitive to from a very young age, we were interested in investigating whether mimicry is modulated by eye contact in 4-month-old infants.

Infants watched videos of models who performed facial actions (e.g. mouth opening, eyebrow raising), whilst either looking towards or away from them.

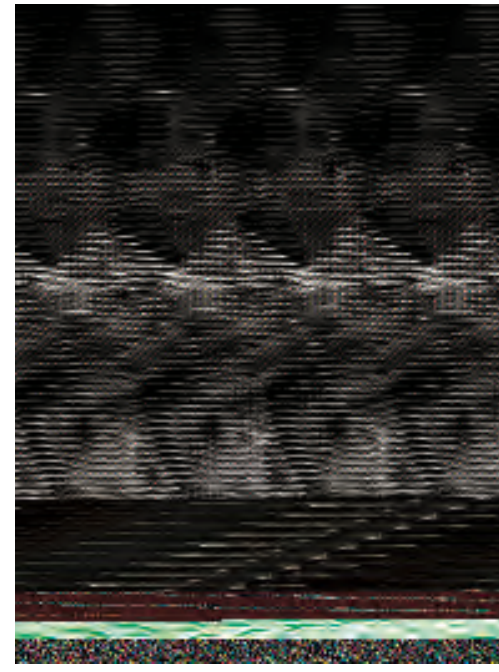
To assess the presence of mimicry we used EMG, a tool that can detect subtle activation of the facial muscles. We found that infants showed a greater tendency to mimic facial actions when the model was looking at them. We also measured the infants' neural responses to the same videos using near-infrared-spectroscopy (NIRS). This technique measures changes in the amount of oxygenated blood in the brain, based on which we can infer which areas of the brain are active.

We found that infants who showed greater activation of brain areas that are sensitive to eye contact when they saw the facial actions performed by a model who was looking at them, also showed greater mimicry of these actions.

11- AND 18-MONTH-OLD INFANTS SHOW GREATER MIMICRY OF NATIVE SPEAKERS

Adults have been shown to increase their mimicry towards people they like, people with high status, and in-group members, while mimicry of outgroup members is inhibited. We were interested to see whether 11- and 18-month-old would also selectively mimic people who are part of their 'in-group'.

We again measured infants' facial EMG while they watched videos of facial actions performed by models who either spoke their native language or an unfamiliar foreign language (Italian). We found that infants were more likely to 'choose' the native speaker by pointing to or touching a photo of her, and that they were also more likely to mimic her facial actions.



GABBLES (GAMMA AND BRAIN-BASED LANGUAGE SPECIALIZATION STUDY)

Anna Kolesnik, Isabel Quiroz, Shannon Connelly and Emily Jones

We all know that babies are very social, and they take huge steps within their first year in development of language and other forms of social communication. A key feature of this period is language-specialisation, or forming a preference towards one's native language. What we don't yet know, is what neural mechanisms are involved in this sophisticated skill. Researching the neural mechanisms will help us to understand infants and children who have difficulty with communicating socially, such as those diagnosed with autism.

We are following a group of babies at 5, 10, and 14 months of age. Using EEG, we are measuring the infants' pattern of high frequency brain activation (or gamma oscillations) in response to looming and receding rings.

Activity in the gamma range has been shown to be involved in sensory processing, memory, and attention and we will be able to compare that to the babies' behavioural and linguistic milestones throughout early development. In an auditory task, infants listen to strings of vowels that end with either a vowel that is higher in pitch or a different vowel, while a researcher blows bubbles or plays with toys.

We predict that there will be increasing activation towards vowel rather than pitch changes with age, which is a key aspect of language learning. We are also using eye-tracking techniques to look at several different aspects of language development, and measure infants looking while adults speak and sing in English, Dutch, and Italian.

Visits to the Babylab have finished and our wonderful families will now complete questionnaires about their child until they are two years old. Anna is currently working on the data, which will be a part of her doctorate work. We look forward to sharing our findings in the next newsletter. Watch this space!

THE SPEAK AND SIGN PROJECT

Evelyne Mercure

How does early language experience influence brain development and language learning? This is the question that the Speak & Sign team is addressing in a collaborative project between UCL and the Babylab. Since spring 2014, we have been collecting brain imaging, eye tracking and behavioural data from a large set of babies. We have had the pleasure of meeting 99 amazing babies with various language experience: babies from monolingual English speaking families, babies from bilingual families in which two or more languages are spoken (for example English and German or English and Cantonese) and babies with Deaf parents who use British Sign Language (BSL) as their preferred mode of communication. Nearly all have already celebrated their 2nd birthday and, therefore, completed their participation in the study. We would like to thank all parents, grandparents and family friends who visited the lab and returned questionnaires; we could not have done it without you all!

Early analyses suggest that all three groups showed similar performance on early communication measures. Interestingly, however, the groups did differ in brain activation patterns. Monolingual infants watching someone speak, activated the left more than the right side of the brain. This pattern fits with what we know from adults: the left side of the brain is dominant for language processing in most people. In bilingual infants with hearing parents, watching someone speak activated the right hemisphere more than the left. Finally, in infants with deaf mothers, watching someone speak OR someone sign activated both hemispheres equally. The results suggest that there are many different neural paths to typical language development.

For more information contact: Evelyne Mercure, e.mercure@ucl.ac.uk

REWARD STUDY

Angélina Vernetti, Tim Smith and Atsushi Senju

Our study investigated children's attention towards social and engaging signals, such as smiling faces and cheerful voices. Using an eye-tracking task, which provides an interactive response when an observer looks at a certain person or an object on a video monitor, we measured children's response to social interaction. Four groups of 3-year-old children and four groups of adults were shown different types of pictures that were either social or non-social (i.e. a person or a sphere), and engaging or non-engaging (e.g. saying 'hello' or saying 'hmm'). Any combination could lead to either the reward video (a short animation) or the non-reward (a blank screen).

We found that both children and adults learned to selectively look at the 'rewarding' person or object. Critically, both children and adults were faster to learn to attend when the socially engaging response, smiling back to the observer and looking at where the reward would appear, led to the rewarding outcome. The children and adults did not simply 'like' the socially engaging person, in which case they would have shown more attention to social and engaging cues regardless of what happens afterwards. Instead, the participants seemed to find it easier to learn that attending to a socially engaging person led to positive outcomes, rather than to a socially non-engaging person or an object. This study highlights that socially engaging communication signals may facilitate reward learning by alerting people to the subsequent rewarding events in the immediate future.

We would like to send a huge thank you to all the families who took part in this project!

LOOK AND REACH STUDY

Natasa Ganea, Jen Haensel and Atsushi Senju

Previous studies have shown that infants prefer to look at pictures of faces to pictures of other objects such as cars, telephones, watches, etc. Such a tendency to look at faces may have an adaptive role for infants because face-to-face communication plays a key role in our social interactions.

In this study, we wanted to find out whether infants just prefer to look at faces, or also prefer to reach for an object with a face image on it. We presented 9-month-old infants with sets of objects, each object depicting a picture of: a face, a car, a mobile phone, and a shadow of a face. We let infants look at these objects first, and then reach for whichever object they preferred. Throughout the study, we recorded infants' eye gaze with a head-mounted eye-tracker specially designed for infants, and recorded infants' hand movements with a video camera.

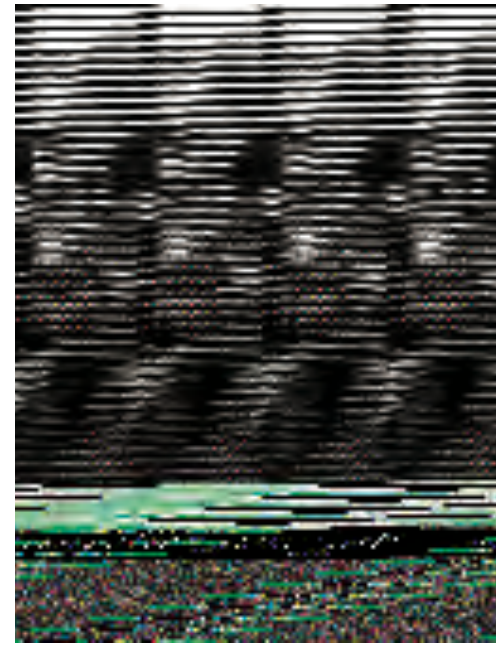
We found that infants both looked longer at the object depicting a face, and tended to look at it more frequently. We interpreted this behaviour as indicative of a looking preference for faces.

Infants also preferred to reach for faces. Infants almost always reached for objects that appeared in one of the two bottom windows, which were closer to their hands. Crucially, when a face was depicted on either of these objects, infants reached more often for the face than the other object.

These findings suggest that infants don't just prefer to look at faces, but they also prefer to reach for objects with a face image on it. It might suggest that infants' preference in looking behaviour can be transferred to their reaching behaviour around this age range.

HEAD MOUNTED EYE TRACKER

The head mounted eye tracker is a piece of equipment that allows us to record babies eye movements during a study. The eye tracker is made out of two small cameras fitted on a hat that is place on the baby's head. One of the cameras is oriented toward the baby's eye and records the baby's eye movements, while the other camera is oriented toward the toys that the baby is touching. By overlapping the data from the two cameras, we can find out which objects the infant looked at during the study.



Babylab volunteer wearing the head mounted eye-tracker

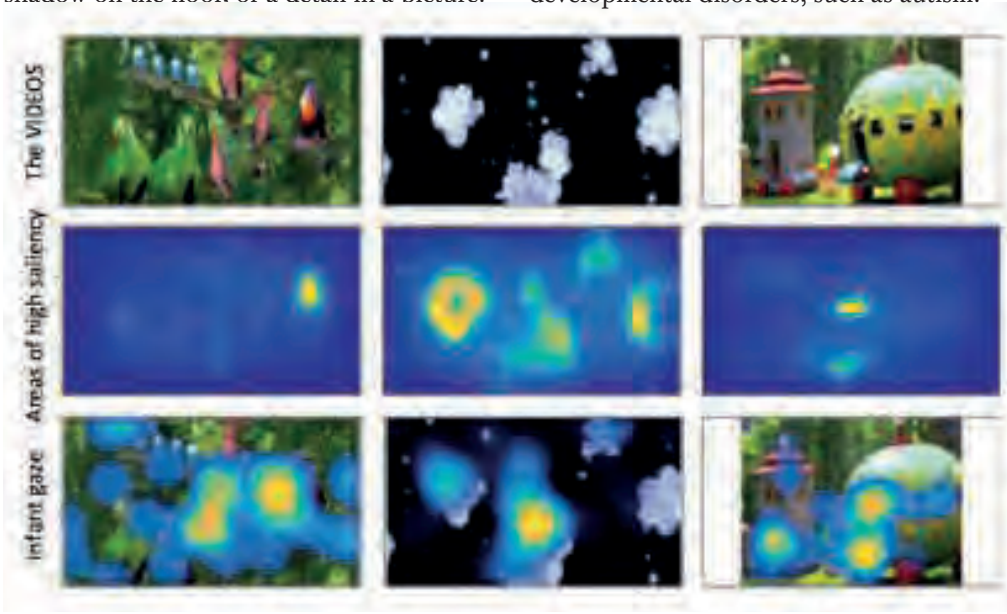
STUDYING AUTISM AND ADHD RISKS (STAARS): WHAT GRABS ATTENTION?

Luke Mason, Emily Jones and the STAARS Team

We are still collecting and analysing data on the STAARS study, but wanted to tell you about one of the findings we have so far.

Children with autism often pay attention to things others rarely notice, such as a shadow on the floor, or a detail in a picture. In our longitudinal study of infants at-risk for autism, we asked the question of whether this detailed oriented attention is present from early in infancy. Babies watched a variety of clips from children's movies and we measured how much their attention was drawn to areas in the movies that had high luminance or colour contrast.

Already when they were 14 months of age, infants that later developed autism spent more time on these high contrast features. In follow-up studies, we will ask in which way these differences in attention affect what infants will learn about in their environment. This will help design better learning environments for children with developmental disorders, such as autism.



CHILDREN'S PATTERN PREDICTIONS AND PREFERENCES WHEN UNAWARE OF LEARNING (LEARN4FUN)

Suzanne Påhlman, Rick Cooper and Natasha Kirkham

In Learn4Fun, children aged 5-6, 7-8 and 9-10 years old played four different versions of a computer game, designed to see if children can learn patterns when tapping on pictures on a touchscreen. After seeing repeating hidden patterns of pictures mixed with random sequences of the same pictures, we asked children which pictures they preferred, and got them to predict patterns on play cards, to investigate what the children learned during the task.

We were interested to see if children would move from implicit responses to better memory recall across the primary school years without any instructions. Does it make a difference if they interact with familiar animals or novel shapes? Are spatial or visual patterns easier to learn?

We found that all children get faster when tapping the repeating pattern of both familiar animals and novel shapes. This indicates that they learn the pattern without knowing it's there and this is true for games presenting both a spatial and visual pattern.

While new shapes support faster tapping speed, animals were learned more effectively for pattern prediction and preference. So, what do we think we can learn from this? Our study would suggest that novel shapes support learning in a more abstract setting, where multiple cues seem more effective, while familiar animals seem to help immediate recall and memory.

'ME, MYSELF AND I' (AS FEATURED IN BBC EDUCATION, SEE MEDIA STORIES)

Chiara Bulgarelli, Carina de Klerk, Antonia Hamilton and Victoria Southgate

At what age do infants start to recognise themselves? Or in other words, at what age do we start to have a 'sense of self'? Up until now, researchers have relied on a task known as the 'mirror self-recognition task' to study the development of the sense of self. In this task, the infant's cheek is covertly marked with red lipstick. If the infant subsequently touches his or her face when they see themselves in a mirror, it indicates that they know what they look like, and that they realise that there is something unusual on their face.

However, we know very little about what is happening in infants' brains when they develop a sense of self. In this study, we use fNIRS to investigate which brain areas react when infants see themselves, either in a live video, like in front of a mirror, or in a video of themselves recorded a few minutes before. Toddlers that exhibited self-recognition during the mirror self-recognition task showed stronger activation in brain regions that are thought to be crucial for self-processing when they see themselves live rather than recorded. Toddlers that did not recognise themselves in the mirror did not show this pattern of activation, suggesting they are still in the process of developing self-awareness.

We also explored the relationship between the emergence of self and important social skills that develop over the first years of life, such as mimicry, the spontaneous tendency to copy others' actions. We found that toddlers who showed a more developed self-awareness also showed a stronger tendency to mimic models who spoke English compared to models who spoke a foreign language. This suggests that emerging self-awareness also affects our perception of, and interaction with, social groups.

INFANT STREAM OF LONDON DOWN SYNDROME CONSORTIUM (LONDOWNS): UNDERSTANDING DIFFERENCES IN BABIES WITH DOWN SYNDROME

Annette Karmiloff-Smith, Michael Thomas, Denis Mareschal, Hana D'Souza, Dan Brady, Isabel Quiroz, Esha Massand and George Ball

Babies with Down syndrome all have an extra copy of chromosome 21. Yet, as a lot of parents, teachers, and clinicians often point out, there are large differences in abilities of babies with Down syndrome. Why are some babies with Down syndrome doing well while others are struggling in many domains including language, memory, and attention?

In addition to understanding these individual differences in children with Down syndrome, the aim of this project is to see whether any of these differences are linked to Alzheimer's dementia. On first view, this connection may seem remote. However, 100% of individuals with Down syndrome develop the brain pathology of Alzheimer's by about 30 years of age. Surprisingly, however, not all go on to develop dementia. What are the risk factors for those who do? What factors protect those who do not? Can some of these factors be traced back to infancy, so that we can see memory differences even at this early age?

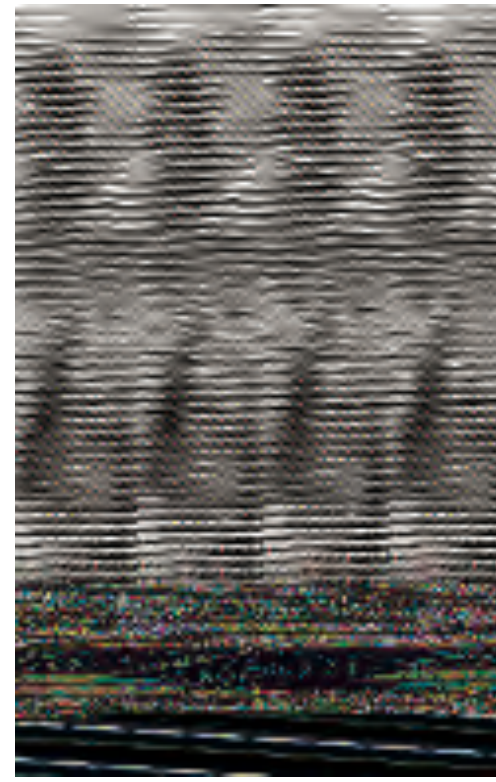
At the Birkbeck Babylab, we have already seen around 100 infants and toddlers with Down syndrome to study individual differences and their link to Alzheimer's. These children participated in all sorts of fun tasks related to attention, memory, language, social interaction, and other important areas of development. We also collected blood and saliva to study differences on the genetic and cellular level.

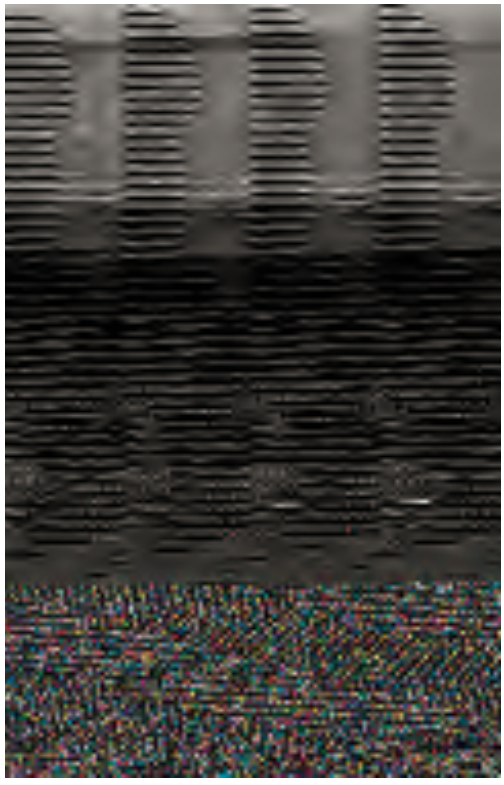
Looking across the first five years of life, as children with Down syndrome get older, it's difficult for them to keep up with typically developing children because they're learning things at a slower pace. From very early on, children with Down syndrome take longer to develop their gross motor skills (e.g., sitting, crawling, walking). As they reach their second year of life, they start showing particular difficulties with their expressive language. However, large differences exist across children with Down syndrome. We are currently trying to understand why some children with Down syndrome do relatively well compared to others, as this may provide important insights for early interventions.

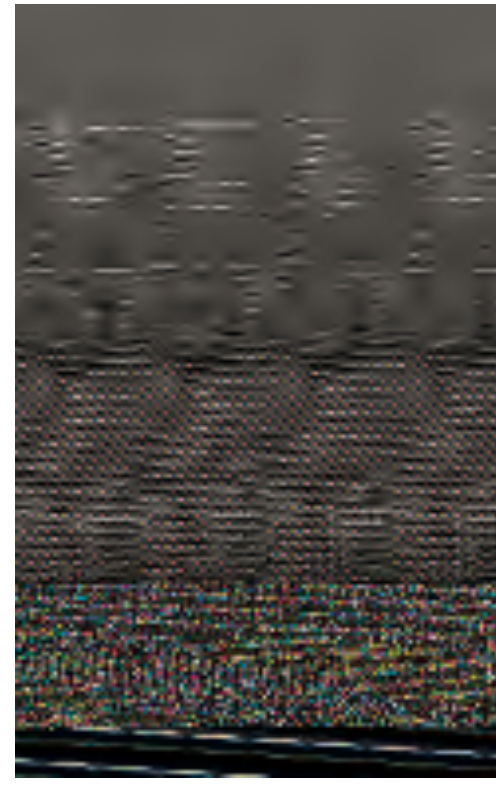
London Down Syndrome Consortium (LonDownS) is a large scale collaborative project between Birkbeck, University College London, King's College London, Queen Mary University of London, The Francis Crick Institute and Nanyang Technological University in Singapore, funded by the Wellcome Trust.

Twitter: @LonDownS

Website: www.ucl.ac.uk/london-down-syndrome-consortium/research-themes/infants







BABY CULTURE

Jen Haensel, Tim Smith and Atsushi Senju

It is well known that faces attract our attention more than any other object. We can recognise people very quickly and without effort. Recent studies have also shown that cultural differences exist in the ways adults look at faces. However, very little is known about when and how these cultural differences develop. The Baby Culture study aimed to better understand the important role of culture in helping babies to adapt to their environment. We ran a series of studies with 10- and 15-month-olds and adults from the UK and Japan. We recorded eye movements with an eye tracker while participants were looking at faces on a screen.

Our results showed that cultural differences existed across all age groups: Japanese participants focused on the eyes whereas British participants looked more at the mouth. Age also influenced how faces were scanned: babies shifted their focus from the eyes to the mouth between 10 and 15 months, while adults distributed their attention across facial features. This possibly reflects the different requirements at each age; for example, 15-month-olds may look more at the mouth as it could help them with language learning.

UNDERSTANDING SOCIAL ABILITIES IN FRAGILE X AND DOWN SYNDROME

Jennifer Glennon, Hana D'Souza, Luke Mason, Annette Karmiloff-Smith and Michael Thomas*

Some children with Fragile X Syndrome (FXS) and Down syndrome (DS) find social interaction and communication particularly challenging. A minority of these children may exhibit what we call autistic-like traits and may receive a secondary diagnosis of autism. Currently, we have very little insight into the nature of autism presentations in children with DS and FXS.

We want to know: 'Is this the same autism that we see in the general population?'. This question holds clinical relevance regarding the suitability of current autism intervention programs to children with DS and FXS. We are using state-of-the-art eye tracking and brain imaging methods to address this question in children aged between 6 and 10 years.

CONTACT

If you have a child with FXS and DS who falls within this age bracket and are interested in taking part or learning more about the study, please do contact me, Jennifer Glennon, by email at *jglenn01@mail.bbk.ac.uk*

This study will run until April 2019. We look forward to presenting our findings in the next newsletter.

** This project was inspired by and designed with the late Professor Annette Karmiloff-Smith. Her presence and contribution is sorely missed.*

LEARNING IN A MULTISENSORY WORLD

Hannah Broadbent, Tamsin Osborne, Denis Mareschal and Natasha Kirkham

The aim of our research was to understand how multisensory information helps children learn at different ages. Multisensory learning uses information that is available to different senses at the same time, for example visual and auditory. Research has established that this method of learning is beneficial to adults, yet there has been no systematic research of this in children.

Overall, we found that the combination of visual and auditory information enhances category learning for children aged 5 to 10 and also improves retention of learning. Interestingly, two pieces of visual information or two pieces of auditory information also enhanced learning more than having just one piece of sensory information. However, not quite to the same extent as having information presented across different sensory modalities. Reinforcing learning with two pieces of sensory information, from the same or different sense, appears particularly beneficial for the younger children, who performed less well than the older children when presented with just one piece of sensory information.

Furthermore, findings from our studies suggest that even though visual information dominates auditory information, tactile information dominates visual information.

We would like to express our gratitude to all the schools, teachers, students and parents who supported our research. Over 2000 children have taken part in our studies! Without their and your help, educational research involving school-age children could not take place and go on to inform future best practice.

TAKE PART

We are always in great need of more schools to take part in our research!
If you are a parent or teacher or work in a primary school and think your school is full of inquisitive children who would enjoy taking part in real life research, please get in touch. It involves a minimal time commitment, does not add to the teachers' workloads and the children have fun. All you need to do is send us a quick email (*t.osborne@bbk.ac.uk*) with the name of the school and the best person to contact there. Thank you!!!

THE UNLOCKE PROJECT

Denis Mareschal, Iroise Dumontheil, Michael Thomas, Dilini Sumanapala, Hannah Wilkinson, Roshni Modhvadia, Claire Smid and colleagues from the UCL Institute of Education

When learning new concepts in school, sometimes children can struggle to apply new information if it competes with old ideas they have already learnt. For instance, a child might think that a dolphin is a fish because it swims in water, rather than labelling it a mammal because it gives birth to live young. Some psychologists think this is because children struggle to inhibit pre-existing ideas if they conflict with new information. As such, psychologists at Birkbeck and UCL developed a classroom-based computer game called "Stop and Think" to train primary school children to learn to inhibit old ideas when learning new concepts from the national curriculum.

The intervention has been successfully delivered in 85 schools across the country. We are now in the process of evaluating some 6000 children's math and science performance on a range of different exercises. Final results will be available from December.

For further information visit unlocke.org

GDPR

We understand that you're most likely fed up with hearing about GDPR(!), but we wanted to let you know that we take the protection and storage of your data very seriously. We are extremely grateful to all the parents and volunteers who sign up to our database to take part in our research. Our database is stored on a secure, encrypted, password protected server and meets all of the new data protection guidance. We will only contact you if your infant/child is eligible for a study that may interest you, or to post and in the future, email you our annual newsletter.

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 7631 6258.

FREQUENTLY ASKED QUESTIONS

Q: ALTHOUGH I RECEIVED MY BABYLAB PACK OF INFORMATION A WHILE AGO, I HAVE NOT YET BEEN ASKED TO PARTICIPATE IN A STUDY. WILL I GET A CALL?

A: Whether or not you get called for a study is dependent on the studies being currently run. Each study has an age range specific to a particular stage of infant development. If you have not been contacted, it is not that we have forgotten about you, it is just that your baby currently does not fit into the age range of any on-going study. Our studies are constantly beginning and ending so new opportunities may arise.

Q: WHAT IF MY BABY IS ASLEEP, HUNGRY OR NEEDS CHANGING UPON ARRIVAL?

A: Many babies fall asleep during their journey to the Babylab. We try to let the babies make their own schedule as it helps us have happy babies who will sit through our studies. If a baby 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 at the Babylab and you can also feed your baby in the reception area. Water, tea and coffee are always available for parents and carers. However, if you know that your baby naps or eats at a certain time, please mention this when booking an appointment.

Q: IF MY BABY IS ILL BUT WE'RE SCHEDULED TO COME IN FOR A STUDY, SHOULD I STILL BRING HIM/ HER?

A: We suggest you don't bring your baby in until he or she gets better as your baby may not be in tip-top shape to participate and as a result may not have fun. We can always reschedule for a time that is better for you and this also helps us keep illnesses in the Babylab to a minimum.

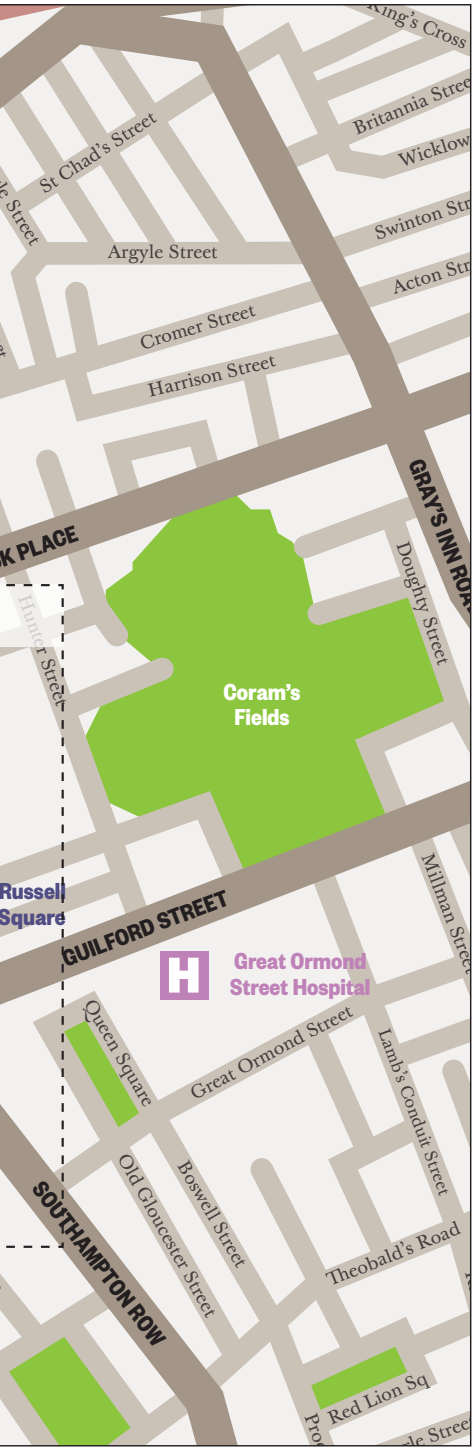
Q: WHAT IF MY BABY DOES NOT WANT TO PARTICIPATE ON THE DAY?

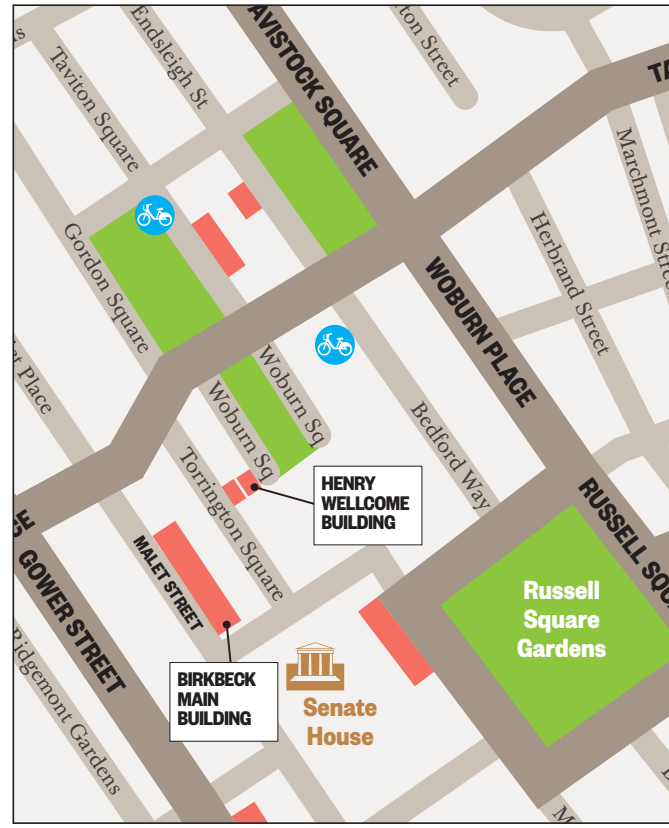
A: Don't worry if your baby decides they do not want to participate on the day of your appointment. They may be tired, teething, feeling unwell or just find the study too boring! This does not mean that your baby will always react this way during a study. Babies change hour-to-hour, day-to-day. We will be happy to invite you round for another visit if your baby comes within the appropriate age range for another study.

Q: WHAT SORT OF TRAVEL ARRANGEMENTS DO YOU PROVIDE FOR FAMILIES VISITING THE BABYLAB?

A: We will cover any travel expenses up to £40 when you visit the Babylab. 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 to the Babylab. If you are outside our taxi zone you will need to make your own arrangements – just keep your receipts and we will reimburse you during your visit. Alternatively, if you choose to drive in, we have parking spaces available close to the Babylab. 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 during your visit.

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 say 'The Wolfson Institute for Brain Function and Development' and 'The Henry Wellcome Building'.

By public transport
We are within walking distance from the following stations: Russell Square, Goodge Street, Euston, Euston Square, Warren Street, Kings Cross and St Pancras.

By car
If driving and using a satnav, please input WC1H 0AA which will bring you adjacent to 28 Woburn Square (not our building). The Babylab has two areas available for parking: Woburn Square (both sides) and Torrington Square (one side only). Woburn Square is easier to access within the one-way system in this area.

By taxi
Please ask the driver to drop you adjacent to 28 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, phone us on *020 7631 6258*.

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