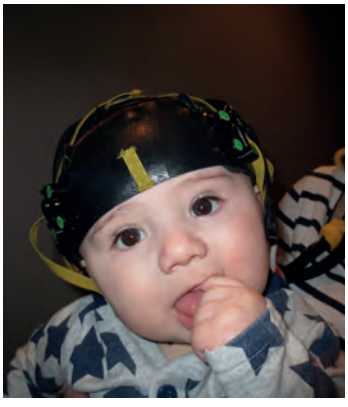
Birkbeck
UNIVERSITY OF LONDON

Babylab

Newsletter 2016



The Birkbeck Babylab would like to thank all of the funders who have supported us in our research.

Action Medical Research & Great Ormond Street Hospital Children's Charity

Autism Speaks, USA

Autistica

Autour des Williams

BIAL Foundation

Bill & Melinda Gates Foundation

British Academy

Department of Health, UK

Economic and Social Research Council

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Jacobs Foundation

Leverhulme Trust

L'Oreal UK and Ireland

The Maurice Wohl Charitable Foundation

Medical Research Council

MQ: Transforming Mental Health

Royal Society

Simons Foundation

Waterloo Foundation

Wellcome Trust

The Wolfson Foundation

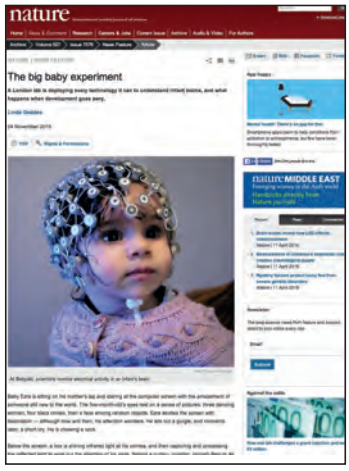
Media stories

The Babylab has been featured in a variety of news articles in the last year

The Big Baby Experiment

The prestigious journal *Nature* featured the Babylab in a news editorial. Read more about how the Babylab uses a wide range of techniques to study the development of the infant mind:

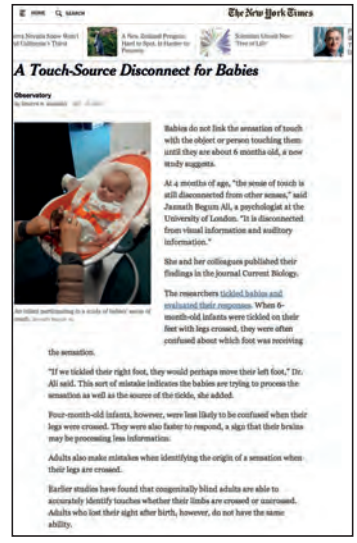
www.nature.com/news/the-big-baby-experiment-1.18701



A touch-source disconnect for babies

Babylab postdoctoral researcher Dr Jannath Begum Ali was featured in the *New York Times*, where she discussed her findings that "babies do not link the sensation of touch with the object or person touching them until they are about 6 months old":

www.nytimes.com/2015/10/20/science/babies-take-months-to-link-touches-to-what-touches-them.html?_r=0



Babylab uses pioneering technology to help children suffering from ADHD

The *Evening Standard* had an article on children who have a greater chance of developing ADHD because they have an older brother or sister with the condition. These infants are taking part in a Babylab study, which aims to detect the condition years earlier than is currently possible:

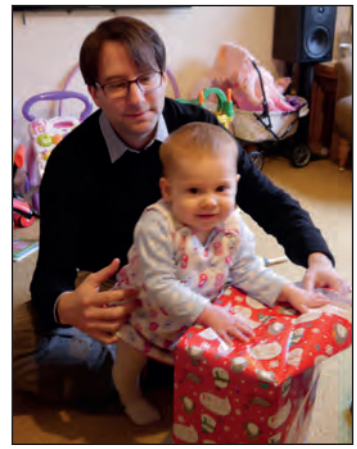
www.standard.co.uk/news/uk/babylab-uses-pioneering-technology-to-help-children-suffering-from-adhd-a2951906.html

Our new arrivals

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

Unax Keussner
(28/7/14)

Charlotte Mason
(12/3/15)



Ariadne Gold
(16/11/15)

John Lloyd-Fox
(24/10/14)

Asa Broadbent
(1/10/15)

The BRIGHT project

Clare Elwell, Sarah Lloyd-Fox, Michelle de Haan, Sophie Budge, Nathan Hayes, Laura Kischkel

Brain Imaging for Global Health is a collaboration between Birkbeck, University College London, Cambridge University and the Medical Research Council, Gambia.

Following the success of Birkbeck Babylab's 2015 Gambia project, the Bill and Melinda Gates Foundation has provided further funding for the BRIGHT project, which will use behavioural measures and the brain imaging techniques of fNIRS and EEG to examine the social and cognitive development of British and Gambian infants over their first 1000 days of life. One of the main questions the project hopes to answer is how malnutrition affects the cognitive development, or thinking skills, of infants.

The BRIGHT project is the first of its kind to collect data on behaviour, thinking, brain functioning and nutrition from babies over time as they develop. This project has the potential to positively impact the lives of future generations of children, who are at risk of poor development because of malnourishment, through better and more targeted interventions. We are currently in the first piloting stage of the study, where parents and their infants are coming in to the Babylab to help us run through the various measures we will be using in the main study. The piloting has been very successful so far and we are looking forward to starting our recruitment in the Gambia soon.

Twitter: @bright_project
facebook.com/brightprojectuk

Attention Control Training for Infants at Risk for ADHD (INTER-STAARS project)

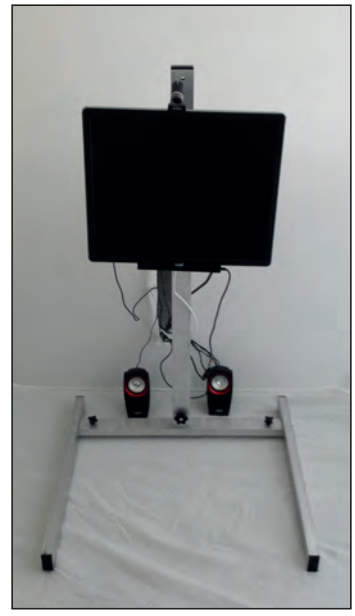
Mark Johnson, Emily Jones, Simona Salomone, Tim Smith, Amy Goodwin, Luke Mason, the STAARS Team, and our collaborating researchers at The University of Southampton and King's College London

Individuals with attention deficit / hyperactivity disorder (ADHD) often have a short attention span, hyperactivity, and problems concentrating. Consequently, this can significantly impact the education and social skills of people with this condition. ADHD often is not diagnosed until 6 or 7 years of age, when problems with attention span and behaviour are already becoming disruptive. Medication and parent training programs are available for children with an ADHD diagnosis. However, it is thought that the best time to intervene is during infancy before the full symptoms of ADHD emerge. Presently there are no available interventions for this age group, therefore, researchers at the Birkbeck Babylab, King's College London and the University of Southampton are working together on a new program called INTER-STAARS.

Researchers are running a study to look at the effectiveness of a new, computer-based, attention-training program to train babies at increased risk for ADHD. The training program uses state-of-the-art technology to show rewarding images when the baby looks at certain parts of the screen. Researchers hope that this will help babies develop concentration and attention skills.

For this study, researchers will be recruiting 50 infants (in either London or Southampton) who have an older sibling or parent with ADHD.

Twenty-five babies will get 12 home-based visits (see photos for the home set-up) where they will do the short attention-training program. The other twenty-five babies will watch short cartoons in these sessions. This allows researchers to compare the groups and see if the training program has an effect. If successful, this study will help provide support to families who have a child diagnosed with ADHD and lay the groundwork for other treatment programs.



We are still recruiting for this study and need participants who have an older sibling or parent with ADHD so please email or phone us for further information, **staars@bbk.ac.uk**, **020 7079 0761**

Eye tracking

The eye tracker uses an infrared light source to measure the reflection of light on the pupil. The data recorded will be used to calculate the rotation of the eye and ultimately the direction of gaze.

Sighted infants of blind parents study

Atsushi Senju, Angélina Vernetti, Natasa Ganea, Kristelle Hudry, Leslie Tucker, Tony Charman and Mark Johnson

Eye gaze is very important for communication, and babies show amazing skills in both recognising and reacting to adults' gaze. By studying a group of sighted infants of blind parents, who have different early experiences of face-to-face communication due to their parent's visual impairment, we were able to compare how the ability to pay attention to an adult's eye gaze develops over time in these infants and infants of sighted parents around the same age.We used eye tracking technology to measure how eighteen sighted infants of blind parents looked at an adult's face and followed an adult's eye gaze when they were 8 and 14 months of age. We also recorded these infants' communication when they played with their blind parent and with a less familiar sighted member of the Babylab staff, as well as looking at their general cognitive, language and motor development. These measurements were then compared with similar data from a group of infants of sighted parents around the same age.

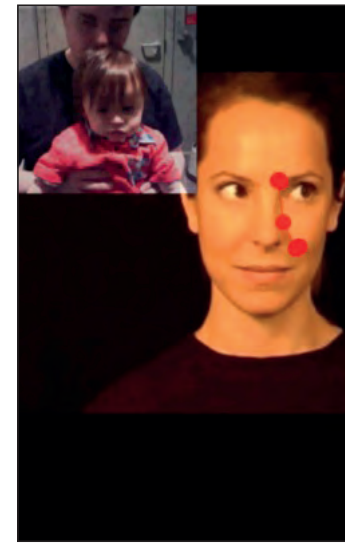
This project has been taking place at the Babylab for the past 7 years and the latest findings have confirmed preliminary results,

> "This study shows that the way adults use eye contact to communicate with babies affects how babies learn to attend to adults' eye gaze."

which showed that infants of blind parents are no different to infants of sighted parents in terms of their overall social communication skills. Moreover, their development of visual attention and memory was more advanced than infants of sighted parents at 8-months-old. One possible explanation for these early cognitive advantages might be that switching the way in which they communicate, between their blind parents and other sighted adults, boosts the early development of visual attention and memory in these infants.

We also found that when viewing an unfamiliar adult on a TV screen, infants of blind parents spent less time paying attention to the adult's eye gaze compared to infants of sighted parents. This result suggests that infants of blind parents learn, during the course of development, how best to communicate with their parents, that they adjust how they attend to an adult's face, and suggests that the interaction between parents and their babies may affect the way children's brains process the social world, and how they learn to communicate.

Jordan (9 months old) with mum doing the 'gaze following' task



Jordan (14 months old) with dad doing the 'face scanning' task

Groovy baby

Sinead Rocha and Denis Mareschal

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

We all know that babies like music; many parents report that their babies like to dance along, and there are some excellent videos available on YouTube to support their claim! However, it is unclear how well infants are able to match their movements to the beat, and how the skill of synchronising movement to music develops over the first years of life.

In our Groovy Baby study, 10- and 18-month-olds were given a set of handheld bells and presented with four songs, some fast and some slow. They were then free to ring their bells both whilst a researcher was ringing bells with them, and whilst watching a video of some bells moving in time to the song on a screen. We recorded their muscle activity using EMG to see just how accurately they could ring with the music in the two situations.

We found that at 18-months, infants were able to ring faster to the faster songs, and slower to the slower songs, but were not able to match the beat exactly. Further, they were closest to being in time with the fastest songs, which are closer to their natural rate of moving. What was really interesting was that having a researcher play with them did not help their accuracy, but when the researcher left and the baby was left to watch the screen, they showed a more diverse set of rhythmic movements – they bounced, rocked, or kicked along with the music much more! At 10-months, the babies always seemed to ring at the same speed regardless of the song, and also displayed other rhythmic movements in both situations. Importantly, our results are the first to suggest that **between 10-and 18-months infants get better at moving in time to music.**

Walk to the beat

Sinead Rocha, Vicky Southgate and Denis Mareschal

Following our Groovy Baby study, we were interested in exploring what changes between 10- and 18-months of age that enables infants to adapt their movement to the rate of the music presented to them (even if they are not matching it exactly).

A difficult skill that most infants master between 10- and 18-months is the ability to walk. Human walking, upright on two feet, is pretty unique – we balance all of our limbs on top of each other, forming an unstable posture, and then we walk around whilst also performing separate movements with the torso, arms and head. It has been suggested that this level of coordination, and the unique corresponding rhythmic input, are the reason why humans have the ability and propensity to move their bodies in time with different tempos of music.

In our Walk to the Beat study, we have again given babies bells to play with music, but this time they do so before and after they experience walking on a specially designed baby treadmill.

We predict that babies' ability to move to the beat will improve with their experience of walking. We are still collecting and analysing our data and will update you on the results in the next newsletter.

NIRS buzz

Laura Pirazzoli, Sarah Lloyd-Fox,
Teodora Gliga and Mark Johnson

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

Touch is a very important sense in a baby's life and it is the first to develop. Along with your voice, your touch is what you mostly depend on to interact with your child throughout infancy. When you want to play with, reassure, or soothe your baby you will most likely find yourself doing so through the sense of touch.

Here at the Babylab we are interested in 'social touch' (slow gentle caressing). How early does the brain start discriminating this type of touch from other types of touch and what are the brain areas that are activated in response to a caress?

In order to answer these questions we stroked 5-month-old babies on their arms either with a hand or with a spoon/toothbrush while recording their brain activations using NIRS. In this way we are able to see if there are brain areas specialised for social touch that activate in response to the hand but not to the toothbrush or the spoon.

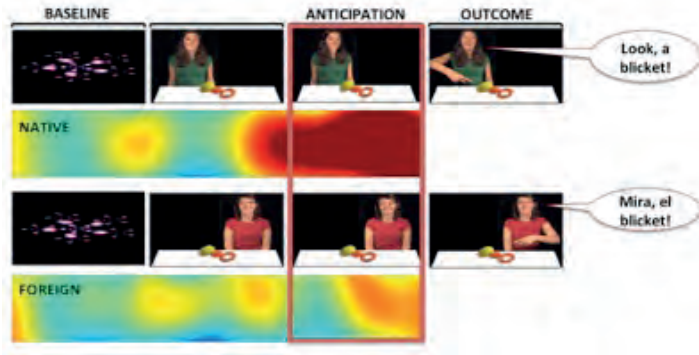
To our surprise, we found that the spoon and the hand resulted in similar responses in brain areas we are interested in. It is possible that the smooth back of a spoon does not differ too much from the soft palm of the hand. We are currently looking at what effects the buzzing toothbrush has, as this is very different from a hand! We will update you in our next newsletter.

I want to learn from YOU …

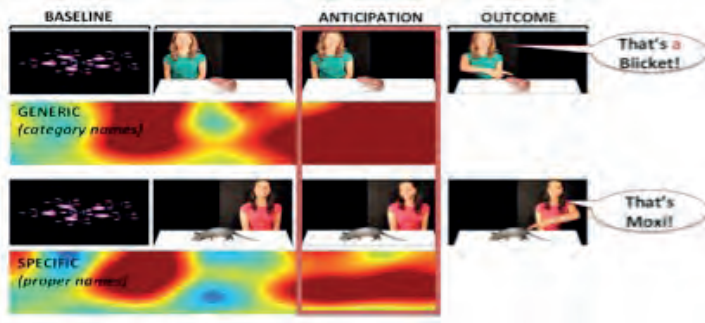
Katarina Begus, Teodora Gliga, Victoria Southgate

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

Babies show remarkable selectivity in their social interactions. They show preferences in who they attend to, receive toys from, and who they learn from. One of the main characteristics infants seem to base their preferences on is whether or not someone speaks the same language as themselves. This preference for native speakers, reflected in babies' preferences for the actions and even the food and musical tastes of native speakers, has commonly been interpreted as early indications of humans' tendency to divide the social world into groups, preferring members of one's own group and disfavouring others. We tested an alternative possibility, namely that the origin of infants' preferences lies in their desire to learn from people, leading infants to prefer people who can provide more relevant information. Using EEG, we measured whether infants' interactions with people speaking different languages are associated with an expectation of information and preparation for learning. The study demonstrated that, indeed, instead of dividing social partners into groups, infants' social preferences appear to be driven by their motivation to learn.



Brain activation (theta rhythm at 3–5Hz) reflecting infants' expectation of information, and greater motivation to learn from Native compared to Foreign speakers (monolingual English speaking babies, 11-month-old).



Brain activation (theta rhythm at 3–5Hz) reflecting infants' expectation of information, and greater motivation to learn Generic compared to Specific information (monolingual English speaking babies, 21-month-old).

… and this is what I want to learn about!

Using the same measure as the study above, we explored what kind of information babies are motivated to learn. Several studies have shown that babies are very efficient learners. They attend to events that offer most information, explore their environment in a way that facilitates learning, and request information from others when they need it. Another strategy for efficient learning would be prioritising learning generalisable information, which could be used and applied in different contexts, over information that applies only to specific items. We tested whether infants use this strategy, measuring EEG when infants could expect to receive either generic (count nouns) or specific (proper names) information. This study demonstrated that 21-month-old infants prefer to learn information that can be generalised than item-specific information, adding further evidence that infants are selective and efficient active learners.

Intervention within BASIS (i-BASIS) Study Results

We are very pleased to announce the results of our early intervention trial, which we carried out in collaboration with the University of Manchester. This was the first trial of its kind looking at the effects of a support programme carried out during the first year of life for infants with an older brother or sister diagnosed with autism.

Social and communicative development of all children is affected by early social interaction with their parents. Infants whose older siblings have autism may exhibit subtle difficulties in communicating with caregivers around their first birthday. Therefore, this intervention was targeted at supporting early social interactions between baby and parent in the first year of life.

The intervention had a positive effect on:

- Babies' interactions with their parents (they were more attentive to their parents following the intervention)
- Babies' flexibility of attention (they were quicker to shift their attention from a picture in the centre of a screen to one on the side, measured using an eye tracker)
- Babies' behaviour (the number of social, communication and flexible behaviour difficulties were reduced in babies following the intervention).

Whilst these results are encouraging and represent an important step towards better support of infants at risk of developing autism, it is important

to note that the intervention was conducted on a small sample of 54 infants, only half of whom were randomly assigned to receive the intervention. Therefore, we will need to carry out the trial on a larger scale before being able to reach any firm conclusions about the intervention's effectiveness.

The Speak and Sign Project

Evelyne Mercure, Laura Goldberg and Kim Coulson

How does early language experience influence brain development and language learning?

In a collaborative project between University College London and the Birkbeck Babylab, we are investigating how early language experience influences brain development and language learning, as well as how the brain represents spoken language and sign language. We are doing this by collecting brain imaging, eye tracking, and behavioural data from babies with different family language backgrounds; monolingual, or bilingual in spoken and/or signed languages.

So far, we have seen 28 babies from monolingual, English speaking families, 27 babies from bilingual families (for example English and German or English and Portuguese), and 35 families with deaf parents who use British Sign Language (BSL) and English. We hope the data will clarify how the brain represents spoken language and sign language and how communicative development is influenced by early language exposure.

Reward study

Angélina Vernetti, Tim Smith and Atsushi Senju

Figure 1

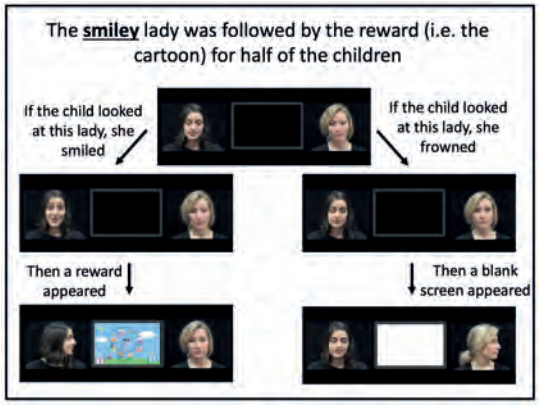
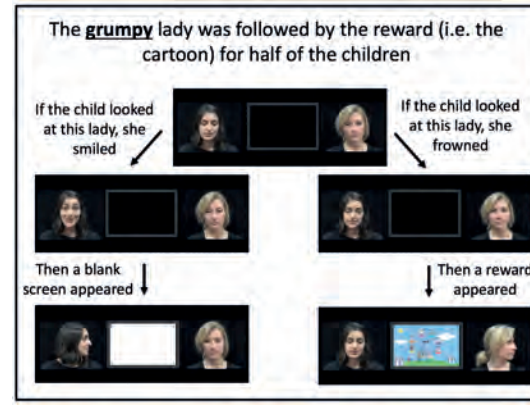


Figure 2



"Children learn more quickly from friendly and informative adults, even when they simply watch videos"

Social signals such as facial expression and gaze direction are an essential part of face-to-face communication. We are curious to know how infants and young children respond to these social signals when they are learning from adults.

In this Reward study, we employed an interactive eye tracking technique, which made videos respond to where children looked on the monitor.

Children initially saw two ladies:

- When the children looked at one of the ladies, she responded with a smile and said 'Hello!' (Fig 1).
- When the children looked at the other lady, she responded with a grumpy face and moaned (Fig 2).
- Soon after one of the ladies responded to the children, either a reward (a short clip of the animated cartoon 'Peppa pig') or a penalty (a not so interesting blank screen) was displayed on the screen.
- The reward appeared soon after the smiley lady (Fig 1) for half of the children and the reward appeared after grumpy lady (Fig 2) for the other half of children who participated in the study.

Both groups of children learned to look at the video of the lady who was followed by the rewarding cartoon. Importantly, the learning happened quicker and more efficiently when the smiling lady was followed by the reward than when the grumpy lady was. These results showed that the engaging nature of social cues facilitates learning in young children. We hope that this interactive eye tracking technique will tell us more about how children learn from others in real life, and the role of social signals in children's learning.

Cecilia, 3 years old, learning which lady is followed by the cartoon in the reward study

Eye-to-eye study

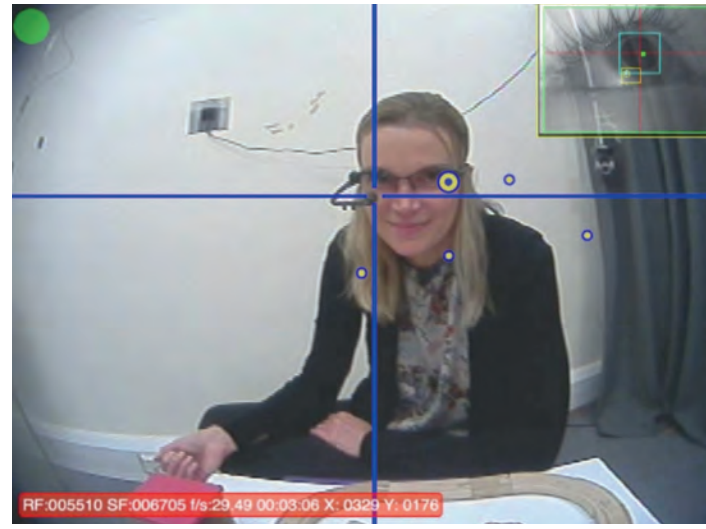
Nadia Neesgaard, Natasa Ganea, Tim Smith and Atsushi Senju

Gaze is an essential part of communication. Whether it is to check what the parent is attending to, or to get the parent's attention to what they are interested in, children actively use eye gaze from their first year of life. This study aims to explore the dynamics of children's eye gaze when playing with their parents.

In this study, parents and children are asked to play with a wooden train set. While playing, both the parent and the child wear a head-mounted eye-tracker, which tracks where the child and the parent are actually looking during the play.

We are particularly interested in how much time children spend looking at the adult compared to the toys, what cues do they use to figure out what the adult attends to (e.g. parent's gaze or parent's hand movements), and how do they integrate their gaze with their language, actions, and gestures to communicate more efficiently with the adult.

Both the study and the method are in their infancy, but we hope to share with you the results of the study in our next newsletter.



Arthur (34 months) and mum taking part in Eye-to-Eye study

Frequently asked questions

If my baby is ill but we're scheduled to come in for a study, should I still bring him/her?

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.

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

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.

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?

Whether or not you get called for a study is dependent on the studies being run currently. 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.

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

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.

What sort of travel arrangements do you provide for families visiting the Babylab?

We will cover any travel expenses up to £40 return 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 you have regarding this during your visit.

Other methods we use in the Babylab include:

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.

ERPs
(Event Related Potentials) use EEG to measure differences in brain activity in response to different 'events'.

How to find us

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 satnav, please input WC1H 0AA (not our building) to take you to Woburn Square.

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.

For Torrington Square parking enter from Byng Place and park on the left-hand side of the Square. When you arrive at the Babylab, we will provide you with a temporary parking permit or just give us a quick call and somebody will bring one out to you.

By taxi

Please ask the driver to drop you outside 28 Woburn Square, WC1H 0AA (not our building). 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.

Join the Babylab 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. Contact us via email at **babylab@bbk.ac.uk**; ring us on **020 7631 6258**, or return the enclosed form.

If you have a friend who you think may enjoy a visit to the Babylab **please ask them to contact us too**. We are constantly in need of babies from birth to twelve months to help us with our research.

Or even more easily, sign up online. We now have a form you can use by clicking on the 'Register Your Baby' link on the website: **www.cbcd.bbk.ac.uk/babylab**

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