The Babylab Newsletter

Centre for Brain and Cognitive Development

AUTUMN 2004

Birkbeck UNIVERSITY OF LONDON

The Babylab is supported by the Medical Research Council

Welcome!...

… to the new look Babylab Newsletter. Once again we would like to thank all the parents, grandparents and carers who have volunteered their lovely babies and toddlers to help our scientific research. Since the previous Newsletter in October 2003, over 750 new names have been added to the Babylab database, and over 650 separate experiments have taken place. Thank you very much!!

We are also very appreciative of the support we get from Health Visitors, GPs, playgroups, nurseries, and staff in Mothercare and other shops who display our posters and leaflets. We don't usually single out any one individual to thank, but this year we would particularly like to mention Angela Roche who is a Health Visitor at a clinic in Islington. We have never had the pleasure of actually meeting her, but over the years her name has come up many times as the person who recommended us to a new parent. Please keep up the good work Angela - we're very grateful!

Media News

You may have heard Woman's Hour on BBC Radio 4 in June when Dr. Teresa Farroni and Leslie Tucker were talking about our Eye Gaze studies. Samuel Seman and his mother Sian helped us out with that interview.

And by the middle of next year we will be featured in National Geographic magazine with photos taken by the internationally famous photographer, Cary Wolinsky. Emily Ryan, Edan Silbiger and Lydia Tucker were our willing volunteers on that occasion.

In this Issue

In the following pages you can read about some of the studies that have been completed in the Babylab over the last year:

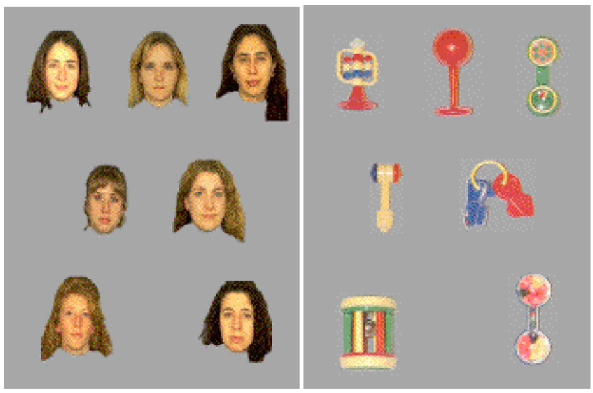
The "Mix Up" Study

by Denis Mareschal & Andy Bremner

What is in a baby's mind when they watch one object move behind another object? The ability to remember that the first object continues to exist even though it is no longer visible is called "object permanence". However, recent studies have shown that object permanence is not an all or nothing kind of thing. Babies have reasonable but limited memories. Thus, when they see an object (say a toy) move behind an occluder, they are unable to remember all aspects of the object but they can remember some aspects of it.

In this study, we examined what kind of information 4-month-olds would remember when viewing different kinds of objects moving behind occluders. Here we used two different and highly attractive objects. The babies viewed both female faces and images of graspable baby toys move in and out from behind two occluding screens. Occasionally we played a trick on the baby and changed some aspect of the hidden object.

In some cases, we changed the location of the hidden object (which of two occluding screens it was hidden behind) and on other occasions we changed the identity of one of the hidden objects (for example, we changed which female face was behind the screen.)



Our findings show that 4-month-olds can remember both identity and location information, but that they selectively remember only one kind of information depending on the kind of object that is being hidden. With toys that they could potentially reach for (e.g., a rattle) they remember the location but *not* the identity of the toy. In other words, they are surprised if the toy has changed hiding locations, but they don't seem to care if a different toy is revealed. With faces, they remember the identity of the face, but not the location of the face. In other words, with faces, they are surprised if a different face appears, but don't seem to care if the face has changed hiding locations.

We believe that this has to do with whether the infants perceive the objects as something that they could potentially reach for and play with. If they think that they can play with it, they will remember the location because this is important in reaching for and retrieving the object. On the other hand, if they do not feel that it is something that they could grasp or reach for, they will remember its identity. Thus even at 4-months of age, infant memory, while limited, is flexible and able to adapt appropriately to the infant's needs and desires.

The "T-Time" Study

by Andy Bremner, Denis Mareschal & Agnes Volein

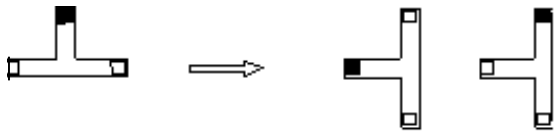
Infants' and young children's early interactions with objects form the basis of their developing understanding of the physical world. An important part of understanding what objects are and how they behave is to learn that they stay the same shape no matter what changes in orientation they undergo.

If we did not have this understanding, objects would seem to be different, or new, every time they moved or we moved. Thus we have the ability to recognise that objects maintain the same shape across changes in orientation.

In this study we examined young infants' ability to recognise the shape of objects across changes in orientation by carefully observing the eye movements of two age groups of infants (4- and 8-month-olds).

As infants examine their visual surroundings they look at individual objects. After looking at a specific object for a certain amount of time, they begin to examine this object differently to how they examine a completely new object. Thus, one way to tell whether or not an infant can discriminate between two objects is to show them one particular object for a period of time, and then to present this object together with a new object. If the infants then look for different amounts of time at the new and old objects we can say that they can tell the difference (discriminate) between them, and that they can remember the old object.

In order to use this method to test infants' ability to remember an object's shape across changes in orientation we firstly show the infants a T-shaped object with one location lit up by a green light (dark area in our diagram). Next we showed the infants two T-shapes (both in an orientation the infants had not seen before), one with the old light on and one with a new light on.



Both the 8-month-olds and the 4-month-olds spent more time looking at the object with the old light on than the object with the new light on. So we were able to conclude that even at 4 months old infants can remember the shape of an object (in the case the location of the light with respect to the object) across a change in the object's orientation.

The infants in these age groups were given one of two discrimination tasks. One discrimination was easy, and the other more complex. Try for yourself. In both pair (i) and pair (ii), the spatial relation of light to object is different across orientations.

However, you will probably notice that it takes you longer to work out that this is the case in pair (ii). In order to discriminate pair (ii) we require a more complex spatial reference system. Both the 4-month-olds and the 8-month-olds were able to make the simple *and* the more difficult discriminations.

This is quite a surprising ability for such young children, as pre-school children (of 4 and 5 years) find the more complex discrimination very difficult!

(i) (ii)

Thus, the next step in our research is to examine exactly how young infants' competence at object recognition relates or compares to our ability at such tasks in childhood and as grown-ups.

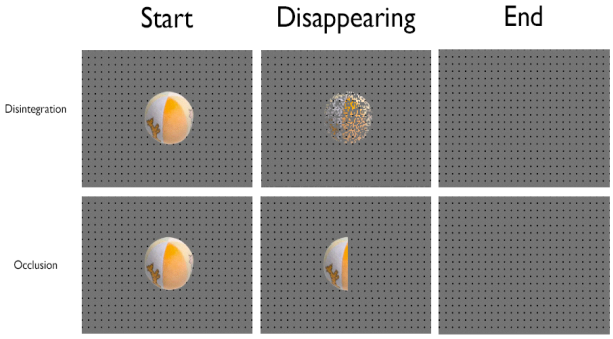
The ERP "All Gone" Study

by Jordy Kaufman, Gergely Csibra and Mark Johnson

When an object disappears from view (because another object moves in front of it, for example) do infants continue to keep it in mind? If so, how does the infant brain accomplish this? The "All Gone" study was designed to answer these questions.

We showed infants movies in which an object was either hidden from view or an object was seen to disintegrate. We examined infants' brain activity after the objects disappeared to see if the infant brain showed signs that it was trying to continue to represent the object even though it could no longer be seen.

We found that when the object was covered up (see panel below), the infant brain did continue to represent the object through what are known as "gamma oscillations." However, no such activity was seen after the object had disintegrated.



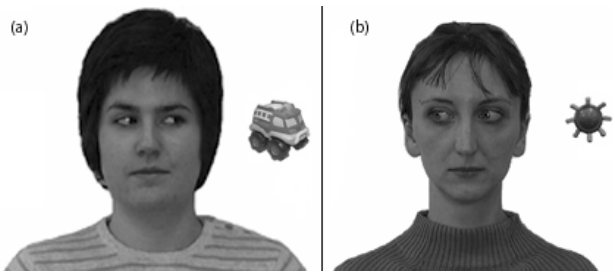
These findings show that (1) the infant brain can continue to represent hidden objects, and (2) the infant brain only does this when the object disappears in a way that is consistent with its continued existence. When the object looks like it has been destroyed, the infant brain does not seem to bother trying to maintain the representation.

The ERP "Objects" Study

by Vincent Reid

A major issue for many doing research with babies is how do they use the direction of another person's eye gaze to get information about things in the world. In this study, 4-month-old infants looked at short videos of an adult face gazing towards or away from toys.

When the babies were shown the objects a second time, they showed differences in brain activity that suggested that those toys which had not been looked at were seen as less familiar than toys previously looked at by another person.



This study showed that the direction of eye gaze of another person leads to enhanced information processing by babies.

This study has been accepted for publication in the scientific journal Neuroreport, and was done in London by Vincent Reid, Mark Johnson and Jordy Kaufman in collaboration with our colleague Tricia Striano from the Max Planck Institute for Evolutionary Anthropology in Germany.

The "Storytime" and "Playtime" Studies

by Denis Mareschal & Seok Hui Tan

Our research looks at how very young children learn to group everyday objects. Young children's ability to categorise such objects is important to their development because this ability helps them learn about things in the world and the environment around them. Being able to group familiar things like cows and birds together as animals, makes it easier for toddlers to know what to expect when they encounter new objects, e.g., camels, from the same category.

The "Playtime" Study

Many thanks to all the families who participated in the Playtime study! We completed this study earlier this year and presented the results in a poster at the International Conference for Infant Studies (ICIS) in Chicago, USA in May 2004.

In this study we were interested in how very young children categorise objects which they may have encountered before – animals (cows, birds, fish) and vehicles (trucks, planes, boats). Previous studies have shown that toddlers can categorise on a *global* level, such as grouping animals together, or, for example, vehicles together. Other studies suggest that toddlers also categorise on a *basic* level, such as grouping types of animals (e.g., cows) together, and separately from other types of animals (e.g., birds). Some researchers suggest that global level categorisation develops before basic level categorisation.

In our study we looked at whether toddlers categorised objects on a basic or global level (or both levels). We explored the possibility that the children's experience with basic or global categories would affect their level of categorisation: e.g., toddlers familiarised with basic category objects (before they were tested for their categorisation ability) might show more basic than global categorisation at test.

We assigned 18-month-olds to one of four groups (Narrow, Broad, Mixed, and Control) and gave each group a different set of familiarisation toys to play with. The Narrow group played with toys from a basic level category (e.g., birds), while the Broad group played with toys from a basic (but broader) level category (e.g., a tea set). The Mixed group played with toys from a global level category – household toys (e.g., cup, bowl, chair, table), while the Control group played with toy blocks. After playing with the familiarisation toys, all of the children (from all four groups) played with a test set of toys. The test toys were twelve objects from four basic level categories (e.g., 3 cows, 3 birds, 3 trucks, 3 planes), and two global level categories (i.e., 6 animals, 6 vehicles).

Aarav Patel

Our results showed that all four groups of toddlers categorised test objects on a basic level – all of the children grouped **types** of animals (e.g., cows) or vehicles (e.g., planes) together. In contrast, only some children showed categorisation on a global level.

Children from the Narrow group did not group objects on a global level, while only children from the Mixed and Control groups clearly grouped the animals (or vehicles) together.

Our findings suggest that toddlers at 18 months can categorise on a basic, as well as global, level. Giving the children prior experience with basic or global level categories does, to some extent, affect the way they categorise: they group objects on a basic level (e.g., cows, planes) regardless of the kind of familiarisation toys presented.
However, children familiarised with a basic level category (e.g., birds) grouped objects on a basic, but not global level, while children familiarised with a broader or global level category (e.g., household objects) grouped objects on both basic and global levels.

Rhys Davies

The "Storytime" Study

We are interested in the various ways toddlers at 18 and 24 months can categorise objects. In particular, we investigate whether toddlers can group objects taxonomically and thematically. An example of taxonomic categorisation is grouping animate objects together, while an example of thematic categorisation is grouping farm animals and farm vehicles, such as tractors, together.

In this current study, we assign the children to one of two groups: the Taxonomic group and the Thematic group. We give all of the children the opportunity to play with some familiarisation toys before presenting them with the test set. With the Taxonomic group, we emphasize the animate and non-animate distinction between the familiarisation toys by presenting the non-animate objects separately from the animate objects; for example, we may present fruit (e.g., banana, strawberry, a bunch of grapes) as one group of objects, and zoo animals (e.g., camel, giraffe, tortoise) as another. With the Thematic group, we emphasize a thematic relationship between the familiarisation toys, such as by feeding the animals the fruit.

Amy Gillespie

After playing with the familiarisation toys, all of the children (from both Taxonomic and Thematic groups) are presented with a test set of toys. The test toys comprise twelve objects which may be categorised on a basic level (e.g., 3 farm animals, 3 dolls, 3 tractors, and 3 pieces of furniture), and on a global level (i.e., 6 animate objects, 6 non-animate objects). The test set may also be categorised in a thematic way - for example, the children may group the dolls with the furniture, and the farm animals with the tractors (farm vehicles); alternatively, they may categorise the dolls with the tractors and the farm animals with the furniture.

Our preliminary analyses suggest that toddlers at 18 and 24 months are able to categorise objects on a basic and global level, as well as in a thematic way.

The "Freeze Frame" Study

by Karla Holmboe, Gergely Csibra and Mark Johnson

The Freeze Frame study investigates babies' ability *not* to do something that is usually an automatic reaction. We call this ability inhibition. In the Freeze Frame task babies are presented with colourful animations in the centre of a computer screen.

Once in a while a small white square is flashed either to the left or right of the central animation. This usually distracts the babies, i.e. makes them look away briefly from the animation. However, we "freeze" the central animation if the baby does look away, thus making it less interesting to look at. In this way the baby will presumably learn *not* to look at the distracting white square in order to keep the central animation dynamic and interesting.

Our first results from this study support the hypothesis that babies learn to inhibit automatic response tendencies. They generally tend to look less at the white squares towards the end of the experiment.

The Freeze Frame study is still in progress. We have now launched a longitudinal study - that is, a study where we follow up a group of children who did the Freeze Frame task at 9 months of age asking them to come back at 24 months to do the "Way Home" and the "Bayley" Studies.

Lab News

This Autumn we have several new people joining us:

Dr. Sanya Krljes was a Research Fellow at Imperial College before coming to the Babylab. Sanya studied adults with schizophrenia for her PhD, and while here she'll be looking at typical development in babies, and is planning to undertake a separately funded project concerning children with autism and their siblings.

Dr. Kazuo Hiraki is with us for one year as a visiting professor from the University of Tokyo. He's interested in brain development in general and, in particular, in infant/mother interaction.

Victoria Southgate has joined us from St. Andrew's University where she did her PhD in the understanding of object permanence in 2-year old children and monkeys.

Karla Holmboe has already been with us a few months. She came from Copenhagen University and will be doing her PhD here. Her particular interest will be in longitudinal studies in typically and atypically-developing children.

Evelyne Mercure joins us from the Universite de Montreal. Her PhD thesis will involve trying to understand the role of the right hemisphere of the brain versus the left hemisphere.

Jennifer Yoon (known as Davie) will be with us for a year doing a Masters degree. She was at Stanford University in California before coming to London, and her interest is in the relationship between cognitive and neural development.

Sarah Snoxall is a part-time PhD student, and she joins us, perhaps less glamorously, from Kentish Town having just come off maternity leave after having her third baby.

If you do come in for one of our studies, you may meet one or more of these people in the Babylab as their research will probably bring them into direct contact with babies.

We also have two new people who work with computer models of the brain and it's development, so you may not see them, but they are:

Lawrence Watling who was at the MRC Cognition and Brain Sciences Unit in Cambridge before joining us to do a PhD. He did his undergraduate degree at Reading University in Intelligent Systems, and while with us he'll be doing behavioural studies with adults and computational modelling;

and **Dimitra Fillipou**, who went directly from Athens to St. Andrew's University in Scotland. She will also be doing her PhD here in connectionist modelling and visual perception.

Other people moving on:

After 2 years with us, **Dr. Seok Hui Tan** is returning home to Singapore, but she'll keep us updated with the results of the Wheelie Study which many toddlers participated in, when they are available.

Dr. Andy Bremner, as well as remaining an associate of the CBCD, is now a Post-Doctoral associate of the Cognitive Science Research Unit at the Universite Libre de Bruxelles, working with Axel Cleeremans and Denis Mareschal.

Dr. Mike Spratling is still an associate member of the CBCD, and has been appointed a lecturer in the Division of Engineering at King's College, London. He and his wife Natalie are expecting their first baby at the end of November. We like to encourage in-house volunteers!

In the same spirit, we can tell you that **Dr. Gilly Forrester**, who many of you may remember was with us last year for nine months, gave birth to her second daughter, Edie at the end of September. Congratulations to Gilly, Neil and Scarlet!

Edie Forrester

Finally, we'd like to thank **Roberto Filippi** for helping us put the Babylab Newsletter together this year. After several years in marketing, he's fulfilling his ambition to study psychology, and is now a part-time, mature student in his second year of pyschology at Birkbeck. Congratulations are also due to him and his wife, Francesca, on the arrival of their second son, Josh – a brother for Daniel, who has already been one of our volunteers. Molte grazie!

Thank you for your support!

Thank you once again for all the help you have given us by bringing your babies to the Babylab, or simply by volunteering. We know that not all of you get the opportunity to participate if your babies don't happen to be the right age at the right time for one of our studies, but we're still very grateful that you took the time to volunteer in the first place. We couldn't have carried out any of our studies without the help of our infant scientists and their carers. Your contribution is vital to infant brain research.

As before, we are always looking for more babies to help us with our research. This year we are particularly interested in also hearing from any of our families who have a child diagnosed with autism or aspergers syndrome, and especially if you also have other young children at home.

JOIN THE BABYLAB OR UPDATE YOUR INFORMATION

Don't lose touch! If you are moving house or having another baby please let Jane know so that we can update our records. Ring us on 020 7631 6258 or return the form below. Feel free to pass this form on to a friend who you think may enjoy a visit to the Babylab.

✂

PARENT'S NAME: _____ **TEL:** _____

ADDRESS: _____

_____

POSTCODE: _____ **E-MAIL ADDRESS:** _____

BABY'S NAME: _____ **SEX:** _____

BABY'S DATE OF BIRTH (OR EXPECTED DATE): _____

Please return form to:
Babylab FREEPOST 32 Torrington Square, London WC1E 7BR
Tel: 020 7631 6258 or email: babylab@bbk.ac.uk with your details
Website: www.cbcd.bbk.ac.uk