



3rd Lancaster International Conference on Infant and Early Child Development (LCICD 2018)

September 5-7, 2018



LCICD 2018 OVERVIEW

Wednesday, Sep 5 th	Thursday, Sep 6 th
8.30 – 9.00 Registration	8.30 – 9.00 Registration
9.00 – 9.15 Opening remarks	9.00 – 10.00 Keynote 2: Laura Bosch
9.15 – 10.15 Keynote 1: Sabina Pauen	10.00 – 11.00 Talk Session 4
10.15 – 11.15 Talk Session 1	11.00 – 11.30 Coffee break
11.15 – 11.45 Coffee break	11.30 – 13.00 Talk Session 5
11.45 – 13.15 Talk Session 2	13.00 – 14.00 Lunch break
13.15 – 14.15 Lunch break	14.00 – 15.30 Talk Session 6
14.15 – 16.15 Poster Session I	15.30 – 16.00 Coffee break
15.45 – 16.15 Coffee break	16.00 – 17.00 Talk Session 7
16.15 – 17.15 Talk Session 3	17.00 – 19.00 Poster Session II
19.30 onwards Conference Dinner at The Sun Café (advance booking required)	18.00 – 19.00 Reception
	Friday, Sep 7 th
	8.30 – 9.00 Registration
	9.00 – 10.00 Keynote 3: John P. Spencer
	10.00 – 11.00 Talk Session 8
	11.00 – 11.30 Coffee break
	11.30 – 12.30 Talk Session 9
	12.30 – 12.45 Awards and Closing Ceremony
	12.45 – 13.45 Lunch break

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ORGANISATION

Committee members: Anna Barnett, Marina Bazhydai, Arthur Capelier-Mourguy, Jacky Chan, Shirley Cheung, Kirsty Dunn, Charlie Lewis, Lynne Hargreaves, Nina Harrison, Katharina Kaduk, Marina Loucaides, Shirly Ma, Eugenio Parise, Nilihan Sanal, Priya Silverstein, Ellie Smith, Gert Westermann, Hannah Wilson

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Twitter: <https://twitter.com/LCICD>

SPONSORSHIP

We are grateful to the Lancaster University Department of Psychology, The Leverhulme Trust, Acuity, and Rogue Resolutions for their financial support.



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IMPORTANT INFORMATION

Location

- The conference will take place at the Lancaster Environment Centre (LEC on campus map) <https://www.lancaster.ac.uk/maps/campus.pdf>. Enter by the Spine entrance, opposite Furness college (FUR on the campus map).
- Keynotes and paper presentations will take place in L001.
- Poster presentations will take place in The Atrium.

Travel information

- For detailed travel information, please visit <http://www.lancaster.ac.uk/travel>
- **Local taxi services** can be reached on the following numbers: +44 (0)1524 32090; +44 (0)1524 35666; and +44 (0)1524 848848.
- **Visitor car parking** is available on campus 24/7 and is free after 6pm. If you are visiting the campus during the day then parking charges apply and can be purchased from any of the 11 pay and display machines across campus at a cost of £2 for two hours. Chip and pin card payment facilities are available at several machines. Alternatively, all-day visitor scratch cards are available from the Cashiers' Desk in University House (building no. 33 on the campus map) priced at £5 each. The cheapest option (£3 per day) will be to park at Alexandra Park Visitor as this is on the edge of campus.
- **In the City:** The bus station is situated on Damside Street in the City Centre. Buses (services U2, U3, U4, 41, 42) leave for the University every 5-10 minutes on weekdays from the Bus Station and also stop at Common Garden Street. Additionally, the U3R bus services run every 30 minutes between the Railway Station and the University (Monday to Saturday daytimes; hourly on Sunday afternoons and evenings; Return ticket: £2.90).
- **On Campus:** Services U3 and U4 serve the southern perimeter road around Alexandra Park. There are also bus stops directly outside the Sports Centre on the main drive.

Registration

- The registration desk is located in the Foyer at the Spine entrance (opposite Furness college FUR on the map).
- The desk will be staffed between 8:30 and 9:00 on Wednesday, Thursday, and Friday as well as during coffee breaks.

Coffee breaks, lunch, and reception

- Coffee breaks (Wednesday, Thursday, Friday), the evening reception (Thursday), and lunches (Wednesday, Thursday, Friday) will take place in the Hub area.

Social events

- Wednesday, September 5th, 2018: Conference dinner
 - This year's conference dinner will be hosted at **The Sun Café** from 19.30. The restaurant is located at 25 Sun Street, Lancaster LA1 1EW.
 - The conference dinner is not included in the registration fee. Advance booking is required via the Online Store (<http://online-payments.lancaster-university.co.uk>).
- Thursday, September 6th, 2018: Evening reception
 - The reception will take place in the Atrium of the Lancaster Environment Centre between 17.00 to 19.00.
 - Canapés and drinks will be served.
 - The cost of the reception is included in the registration fee.

Internet access

- To access the Visitor Wi-Fi network, simply select the "LU-Visitor" network, then follow the registration screens, or log in to eduroam.
- Visitor Wi-Fi access will last for 24 hours. For longer access, you will need to register again.
- For support on the day, please see one of our volunteers with a Babylab sticker.

FOOD & DRINK ON CAMPUS AND IN TOWN

Below is a list of favourites, based on an informal survey of Lancaster Psychology staff and students. Reservations in the town centre are recommended, especially for larger groups.

Options on Campus

- **Café 21** - Nice vegetarian/vegan/gluten-free food, and great views.
- **Pizzetta Republic** - Good restaurant for those who like pizza, late opening times. Good for coffee, too.
- **Grizedale Café Bar** - Famous for Stone Willy's pizzas and hot wraps as well as dinky dipping hot donuts with a choice of sprinkles and sauces.
- **Sultan of Lancaster** - Indian restaurant and takeaway, serves a variety of curries, chicken and wraps. Late opening times.
- **The Deli** - Popular deli salad bar with fresh, homemade tartlets, a selection of meats and cheeses as well as hot roast sandwiches and filled focaccias.
- **The Lounge** - Restaurant on campus. Good food and good place for a sit-down coffee.
- **Go Burrito** - urban Mexican-style restaurant serving burritos, burrito bowls, tacos, loaded fries, to name a few.
- **The Mill (Fylde College)** - A great choice of fresh toasties and sandwiches, or for something more filling, try the burgers and burritos.
- **The Trough of Bowland (College)** - Traditional homemade pie served with potatoes and vegetables from 12.00pm. Open for dinner, too.
- **Trevor (Furness College)** - Freshly ground coffee, whole-leaf tea and a variety of cakes with gluten-free options.
- **Subway** - Offers a wide variety of fresh sub sandwiches.
- **Wibbly Wobbly Burger** - Good burger place, simply follow directions to Grizedale College.
- **The Winning Post (Cartmel College)** - Serves a range of traditional pub food including starters, sharers, sandwiches, and classic meals such as lasagne, mixed grill and gammon steak. Open for dinner, too.

Options in Lancaster town centre

- **1725** - Nice Tapas restaurant. Serves dinner until 21:30 (though open for drinks until 23:00). (Market Street, 01524-66898).
- **Full House Noodle Bar** - Chinese, Malaysian. Very casual. Just walk through the shop and go upstairs. Shuts at 21:00. (21 Common Garden Street, 01524-842888).
- **Kashish** - Good Indian restaurant. Bring your own alcohol (which can be purchased at nearby Sainsbury's supermarket). Open until 23:00. (32 Parliament Street, 01524-388222).
- **Nami Sushi** – Lovely sushi in a cosy and friendly environment (31-35, China Street, 01524 33388).
- **Priory Hall** - Serves excellent coffee from local, award-winning roastery (Atkinson's). Nice cakes, too. Shuts at 17:00. (10 China Street)
- **Pizza Margherita** - Authentic pizzas, plus pasta dishes, in an informal setting, with classic marble tables. (2 Moor Lane, 01524-36333)
- **Quite Simply French** - French cuisine with a chic style and an intimate vibe. (27a St George's Quay, 01524-843199).
- **Siam Balcony** - Authentic Thai cuisine in a relaxing atmosphere. (6A Chapel Street, 01524-383889)
- **Sun Café** - Nice restaurant, Mediterranean cuisine. They also run Sun Pizza, a good pizza restaurant in the same street. (25 Sun Street, 01524-846252).
- **Sun Pub** - Good pub food, also nice for drinks. (63-65 Church Street, 01524-66006).
- **The Borough** - Nice pub in town centre, has its own brewery. Serves food till 21:00, drinks till 23:30. (3 Dalton Square, 01524-64170).
- **The Herbarium Bar** – Lancaster's newest vegan establishment. You will find a hangout cafe, yoga studio, bar, and facilities for events (5 - 7 Great John Street, 07903 356458).
- **The Music Room** - Serves excellent coffee from local, award-winning roastery (Atkinson's). Nice cakes, too. Shuts at 17:00. (Sun Square)
- **The Tap House** - Artisan brews and niche wines, good for drinks (open till midnight). (Gage Street, 01524-842232)
- **The Water Witch** - A towpath pub in a converted stable block. Perfect for some afternoon/evening pub grub by the canal.
- **Whale Tail** - Vegetarian dishes from local, organic and fairtrade produce in a quirky café. Open till 4.30pm. (78a Penny Street)

DAYS OUT IN AND AROUND LANCASTER

Things to do in Lancaster

- **Williamson Park** - Lancaster's favourite Park offers beautiful panoramic views of Lancaster and its surrounding area. The Ashton memorial, butterfly house and mini beasts (meet the new arrival of Lancaster's meerkats) and birds attractions make for an entertaining visit.
- **Lancaster Castle** – Take a tour of Lancaster's most historic building dating back to Roman times.
- **The River Lune** – Take a stroll along the River Lune. The pathway between Lancaster and Caton offers some interesting features on and around the river.
- **The Zone soft play, Lancaster** – Found in central Lancaster, this offers play areas for babies, toddler and juniors including sensory features, wall puzzles, bouldering wall and aerial slide.
- **Morecambe beach and promenade** – Take the train or bus to our nearest seaside town. This long stretch of beach is ideal for sandcastles providing the English summer weather is kind to us.
- **Lancaster Market** – If you are after some locally produced food (potted shrimps from Morecambe Bay, Lancashire cheese, Lancashire sauce, and smoked fish), there are many stalls at the outdoor Charter market on Wednesday and Saturday.



Lancaster canal (left) and The Ashton Memorial (right)

If you have your own transport:

- **Old Holly Farm** – Located on the A6, 5.5 miles from the University, this farm offers the opportunity to meet their baby lambs, chicks and calves alongside other farmyard animals as well as an indoor play area, café and farm shop.
- **The Pudding House, Wallings Farm** – Located close to the A6, 5.5 miles from the University, the pudding house boasts homemade, fresh food including the best ice-cream sundaes to be found. Choose from a wide range of flavours and visit the farm animals. N.B. Don't panic if you don't have transport - we have our very own Wallings farm ice-cream shop on campus.

A little further afield:

- **Liverpool and Manchester city centres** can be reached within 1 – 1.5 hours by rail from Lancaster. Here you can visit a fantastic selection of museums, theatres, shops and parks.
- **The Lake District** can easily be reached within 40 – 45min by rail from Lancaster. Here you can explore the area walking, cycling, or splashing about in one of Britain's breath-taking spaces.



View from Catbells, The Lake District

SCHEDULE

Wednesday, September 5, 2018

8.30 to 9.00 Registration

9.00 to 9.15 Opening remarks

9.15 to 10.15 **Keynote: Sabina Pauen** (*Chair: Eugenio Parise*)
A closer look at the process of self- and co-regulation in early childhood research

SESSION 1: ADVANCES IN INFANT MEASUREMENT SCALES

Chair: Paula McLaughlin

10.15 to 10.45 Samuel Forbes and Kim Plunkett
Toddlers' visual closure in colour vision testing

10.45 to 11.15 Julien Mayor and Nivedita Mani
A short version of MacArthur-Bates Communicative Development Inventories of high accuracy

11.15 to 11.45 Coffee break

SESSION 2: LANGUAGE DEVELOPMENT I

Chair: Julien Mayor

11.45 to 12.15 Nayeli Gonzalez-Gomez, Frances O'Brien, Sheula Barlow, Sharon Baug and Margaret Harris
Early phonological development in preterm babies and babies from lower SES families

12.15 to 12.45 Jill Lany
Individual differences in infants' nonadjacent dependency learning

12.45 to 13.15 Luca Onnis and Erik Thiessen

Language-specific statistical computations in adults and infants

- 13.15 to 14.15 Lunch Break
- 14.15 to 16.15 Poster Session 1
- 15.45 to 16.15 Coffee Break

SESSION 3: DYADIC INTERACTION

Chair: Han Ke

- 16.15 to 16.45 Sam Wass and Victoria Leong
Inter-personal neural synchrony and neural responsivity: How mature brains scaffold immature brains during shared parent-child play
- 16.45 to 17.15 Amy Bidgood, Lewis Ball, Samantha Durrant, Michelle Peter, Julian Pine and Caroline Rowland
Symbolic play and language development in the Language 0-5 Project
- 19.30 onwards Conference Dinner at The Sun Café (advance booking required)

Thursday, September 6, 2018

8.30 to 9.00 Registration

9.00 to 10.00 **Keynote: Laura Bosch** (*Chair: Kirsty Dunn*)
Language learning in bilingual contexts: A closer look at input properties

SESSION 4: BILINGUALISM

Chair: Louah Sirri

10.00 to 10.30 Julien Mayor, Jun Ho Chai, Hui Min Low and Tze Peng Wong
Is the relative distribution of verbs and nouns modulated by socio-cultural influences? Evidence from bilingual infants and toddlers in Malaysia

10.30 to 11.00 Annika Unger and Barbara Höhle
Bilingual early word segmentation: Evidence from infants acquiring French and German

11.00 to 11.30 Coffee Break

SESSION 5: COGNITIVE DEVELOPMENT

Chair: Gemma Taylor

11.30 to 12.00 Osman Skjold Kingo, Trine Sonne and Peter Krøjgaard
Does the storyline matter? Eighteen-month-olds' memory for movies

12.00 to 12.30 Isabel C. Lisboa, Daniel Basso, Sandra Queirós, Jorge A. Santos and Alfredo F. Pereira
3 months-old' preferences for human motion configuration and its subsequent decline

12.30 to 13.00 Tamar Keren-Portnoy, Helena Daffern, Rory Depaolis, Kenneth Brown, Christopher Cox and Florence Oxley
Six-month-olds learn to operate an app with their voice

13.00 to 14.00 Lunch Break

SESSION 6: ADVANCES IN EYE-TRACKING METHODS

Chair: Tom Fritzsche

14.00 to 14.30 Sylvain Sirois
What matters more than where: Infant pupil dilation and gaze location

14.30 to 15.00 Matt Hilton, Jie Ren, Silvana Poltrock and Barbara Höhle
Using eye-tracking to measure individual differences in cognitive functions during infancy and early childhood

15.00 to 15.30 Han Ke, Gert Westermann and Katherine Twomey
New evidence for systematicity in infants' curiosity-driven learning

15.30 to 16.00 Coffee Break

SESSION 7: SOCIAL COGNITION AND LANGUAGE

Chair: Balint Forgacs

16.00 to 16.30 Marianna Jarto, Johanna Rüther, Aylin Küntay and Ulf Liszkowski
Developmental relations between early social-cognitive abilities

16.30 to 17.00 Ditte Boeg Thomsen, Anna Theakston, Birsu Kandemirci and Silke Brandt
Perspective-marking language and false-belief reasoning in 2-to-3-year-olds

17.00 to 19.00 Poster Session 2

18.00 to 19.00 Reception

Friday, September 7, 2018

8.30 to 9.00 Registration

9.00 to 10.00 **Keynote: John P. Spencer** (*Chair: Gert Westermann*)
Using fNIRS and DFT to understand how working memory capacity changes in early development

SESSION 8: DEVELOPMENTAL DISORDERS

Chair: Gert Westermann

10.00 to 10.30 Hanna Alonim, Hillel Braude, Ido Lieberman and Danny Tayar
Identifying variables associated with the prodrome of Autism during the first year of an infant's life

10.30 to 11.00 Charleen List, Ben Ambridge, Elena Lieven and Julian Pine
Testing two different models of verb-marking error in children with Developmental Language Disorder and language-matched controls

11.00 to 11.30 Coffee Break

SESSION 9: LANGUAGE DEVELOPMENT II

Chair: Tamar Keren-Portnoy

11.30 to 12.00 Paul Ratnage, Thierry Nazzi, Lionel Granjon and Caroline Floccia
The impact of phonetic and intensity changes on word recognition in British English-learning 5-month-olds

12.00 to 12.30 Tom Fritzsche, Adamantios Gafos and Barbara Höhle
Is any type of input variability beneficial for mapping novel words to objects in 14-month-old infants?

12.30 to 12.45 Awards and Closing Ceremony

12.45 to 13.45 Lunch

POSTER PRESENTATIONS

Session 1: Wednesday, September 5, 2018, 14.15 to 16.15

1. Limor Adi-Bensaid, Irit Feldman and Yossi Freier-Dror
The use of a parent-report questionnaire to examine the development of communication among 1- to 18-month-old toddlers with typical development
2. Jenny Gibson, Witold Orlik, Dianne Newbury, Peter Clough and Umar Toseeb
The relationship between early communicative environment and educational outcomes for children and adolescents with and without indicators of Developmental Language Disorder
3. Anastasiia Ogneva
On grammatical gender agreement: a study of Spanish-speaking children with Specific Language Impairment
4. David Elliott
Assessment and post-treatment evaluation of absence epilepsy seizures
5. Hannah Wilson, Gavin Bremner and Peter Walker
Do infants expect that dark objects are heavy and bright objects are light?
6. Trinh Nguyen, Ezgi Kayhan, Hanna Schleihau, Daniel Matthes, Pascal Vrticka and Stefanie Hoehl
The Effects of Caregiving on Bio-Behavioural Synchrony in Mother-Child Interactions
7. Leigh Keating
The Role of Shape Bias in 'Online' and 'Offline' Categorisation
8. Sabine Graetz and Sabina Pauen
To play or not to play... – Do children overimitate more in playful than functional settings?
9. Alexia Revueltas
Exploring the relationship between engagement and learning: A new perspective

10. Sriranjani Karthik, Eugenio Parise and Ulf Liszkowski
Looking beyond observed actions: Social communication changes the ‘back-of-hand’ gesture interpretation
11. Rachael Cheung, Padraic Monaghan and Kirsty Dunn
Environmental effects on parental teaching and infant word learning
12. Marina Bazhydai, Gert Westermann and Eugenio Parise
Preverbal infants’ social referencing as information-seeking in situations of referential uncertainty
13. Lyssa de Vries, Steffie Amelynck, Melinda Schaap, Ilse Noens, Gunnar Naulaers, Bart Boets and Jean Steyaert
Developmental trajectories in infants at high risk for ASD
14. Ildikó Király, Katalin Oláh and Zsófia Válint
Expectations of shared cultural knowledge hinder children’s false belief attribution
15. Victoria Singer
Using Dynamic Assessment to Understand Word-Learning in Late Talkers
16. Pegah Athari and Susan Rvachew
Maternal vocal imitation in mother-infant interaction
17. Hye Jung Cho, Youjeong Park, Jinwook Kim and Naya Choi
Does children’s observation of adult divergent thinking enhance their own divergent thinking?
18. Louah Sirri, Szilvia Linnert, Vincent Reid and Eugenio Parise
Are words more efficient than sounds in activating conceptual representations?
19. Marina Loucaides, Katherine E. Twomey and Gert Westermann
The effect of labeling on infants’ novel object exploration
20. Steffie Amelynck, Lyssa de Vries, Melinda Schaap, Sofie Vettori, Chiara Bernagie, Bieke Bollen, Guy Bosmans, Jean Steyaert, Ilse Noens, Bruno Rossion, Els Ortibus, Gunnar Naulaers and Bart Boets

Assessing socio-communicative sensitivity in at-risk infants with fast periodic visual stimulation

21. Christian Kliesch, Stefanie Hoehl, Vincent Reid, Anna Theakston and Eugenio Parise
The role of communication in action segmentation
22. Trine Sonne, Osman Skjold Kingo and Peter Krøjgaard
Spontaneous memories in 35- and 46-month-old children: How important is the experimenter as a cue at the time of retrieval?
23. Bethany Wainwright, Melissa Allen and Kate Cain
Facilitating word learning and symbolic understanding in typically developing infants and children with autism spectrum disorder: The role of iconicity
24. Eleanor Smith, Trevor Crawford, Megan Thomas and Vincent Reid
Maternal personality and its influence on facial expression and sensory gating development
25. Anat Ninio
Modification is absent from three-word long sentences
26. Lena Ackermann, Robert Hepach and Nivedita Mani
Individual differences in early word learning: The effects of category curiosity and density
27. Silvia Sánchez Calderón and Raquel Fernández Fuertes
The emergence of English and Spanish dative alternation as seen in monolingual child data
28. Mariia Pronina, Iris Hübscher, Judith Holler and Pilar Prieto
Does enacting mental states and emotions improve children's perspective taking and pragmatic skills? A training study
29. Amy Bidgood, Elizabeth Kirk, Samantha Durrant, Michelle Peter, Julian Pine and Caroline Rowland
Baby Sign, mind-mindedness and language development

Session 2: Thursday, September 6, 2018, 17.00 to 19.00

1. Gemma Taylor and Sarah Norgate
Young children's emotional development in the digital world
2. Lana Jago, Michelle Peter, Samantha Durrant, Amy Bidgood, Julian Pine and Caroline Rowland
Investigating Predictors of Individual Differences in Productive Vocabulary and Their Ability to Identify Late Talking Toddlers
3. Katrina Martindale, Hope Hodgson-King and Nayeli Gonzalez-Gomez
Exploring Infants' Ability to Understand Emotion Words
4. Hope Hodgson-King, Katrina Martindale and Nayeli Gonzalez-Gomez
Early walker' or 'Early talker'? The effects of Infant Locomotor status on Infant Language acquisition
5. Florence Oxley, Tamar Keren-Portnoy and Eytan Zweig
Tracing the emergence and development of cerebral lateralisation in babble
6. Tiphaine Caudrelier, Lucie Ménard, Jean-Luc Schwartz, Pascal Perrier and Amélie Rochet-Capellan
Transfer gives a glimpse into emerging speech units: a speech production study in 4 year-old children
7. Crina Marina
Emotion recognition deficits in preschoolers with callous-unemotional traits
8. Priya Silverstein, Gert Westermann, Teodora Gliga and Eugenio Parise
Preverbal infants' attention allocation to communicative and non-communicative scenes
9. Marina Bazhydai, Priya Silverstein, Gert Westermann and Eugenio Parise
Preferential transmission of simple actions over pedagogically demonstrated actions in two-year-old children
10. Ingeborg Roete, Marisa Casillas and Paula Fikkert
Relating maternal speech rate changes to child language proficiency

11. Kirsty Dunn, Tim Donovan and Vincent Reid
Using Postnatal Methodologies to Index Behavioural and Physiological Response to Social Stimuli in Utero
12. Juan Giraldo-Huertas and Graham Schafer
An applied strategy for interventions in children at risk of not reaching their potential in middle-low income countries
13. Lizhi Ma, Katherine Towmey and Gert Westermann
How Perceived Emotions Influence Toddlers' Word Learning
14. Morgane Jourdain and Karen Lahousse
The early acquisition of relative clauses and cleft sentences in French
15. Samantha Russell and Kate Cain
Bunnies in Dresses: How Anthropomorphism Impacts Young Children's Processing of Narrative
16. Bálint Forgács, Eugenio Parise, Gergely Csibra, György Gergely, Ildikó Király and Judit Gervain
Preverbal Infants' Theory-Of-Mind on Other People's Linguistic Understanding
17. Louah Sirri, Szilvia Linnert, Vincent Reid and Eugenio Parise
Infant directed speech enhances face processing
18. Diana Tham, Pei Jun Woo and Gavin Bremner
A cross-cultural comparison between same- and other-race face scanning in infants.
19. Giorgia Bussu, Alberto Llera Arenas, Emily Jones, Mark Johnson, Christian Beckmann and Jan Buitelaar
Intrinsic patterns in longitudinal measures of behaviour and neural sensitivity to faces at 8 months are related to ASD clinical outcome at 36 months
20. Marina Loucaides, Katherine E. Twomey and Gert Westermann
How do mothers respond to familiar and novel objects during playing events with their child?

21. Shirley Cheung, Eugenio Parise, Silke Brandt and Gert Westermann
Can bilingualism facilitate flexibility in speech perception?: Evidence from a cross-linguistic fNIRS brain-imaging investigation
22. Melanie S. Schreiner, Nicole Altvater-Mackensen and Nivedita Mani
Familiar words aid infants' word segmentation
23. Mutluhan Ersoy, Dr. Emily Jones, Prof. Mark Johnson and Prof. Tony Charman
Developmental Trajectories of Anxiety Problems among Children at Risk for ASD: Cross-Lagged Investigations
24. Silke Fischer, Iris Nomikou, Lilli Kindsvater and Katharina J. Rohlfing
Capturing infants' early communication abilities between 8 and 10 months - the German "Baby-Komm"
25. Kin Chung Jacky Chan and Padraic Monaghan
Young Children's Use of Mutual Exclusivity and Acceptance of Lexical Overlap in a Bilingual Context
26. Joan Birules, Laura Bosch and Ferran Pons
Face-language matching skills in monolingual and bilingual 4-month-old infants
27. Franziska Krause and Katharina J. Rohlfing
Learning to take the communicative role – a training study with a focus on shyness
28. Osnat Segal, Nitsan Kliger and Liat Kishon-Rabin
Infants' preference for speech over time-reversed speech in 'on- and off-channel' noise
29. Anina Ritterband-Rosenbaum, Mark Schram Christensen, Mikkel Damgaard Justiniano, Kristian Møller Moltke Martiny and Jens Bo Nielsen
Sense of agency is the key for successful early intervention in infants with congenital brain lesion

KEYNOTE ABSTRACTS

Wednesday, September 5, 2018

Sabina Pauen (Université de Grenoble Alpes, Grenoble, France)

A closer look at the process of self- and co-regulation in early childhood research

Self-regulation in early childhood is known to be highly predictive of later academic and economic achievements, social skills and health-related behaviours above and beyond IQ and SES. This raises the important question what determines the development of corresponding skills in early years. How easily infants come into states of imbalance and how intensely they respond to corresponding situations partly depends on their temperament. How quickly and efficient states of increased arousal are down-regulated partly depends on the quality of co-regulation provided by caregivers. Soon, observational learning and direct instructions also help young children to develop efficient self-regulation strategies. But how much they can profit from corresponding input partly relies on basic cognitive skills, often called executive functions. To better understand the complex interplay between infant temperament, caregiver co-regulation and executive functions, methods are needed that monitor age-related changes in all three these aspects in parallel. Furthermore, theoretical models are needed that integrate these different lines of research. In my talk, I will present work in our lab focusing on these issues.

Thursday, September 6, 2018

Laura Bosch (University of Pennsylvania, USA)

Language learning in bilingual contexts: A closer look at input properties

Infants growing up in bilingual contexts are exposed to a more complex linguistic input from which they will gradually build language-specific phonetic and phonological categories, eventually characterizing words in their early lexicons. Input languages can show different levels of proximity relative to their rhythmic, phonetic, phonological lexical and morpho-syntactic properties, but the role of language proximity in bilingual infant studies has seldom been the focus of specific research until recently. In this talk an overview of recent studies addressing this issue will be offered. It is argued that language proximity factors can determine specific adjustments in bilinguals' early speech processing, from language differentiation, and phonetic categorization to word segmentation and phonological encoding of words. Taking into account language

properties in the input to the bilingual learner will provide a more nuanced account of bilingual infants' trajectories in language learning.

Friday, September 7, 2018

John P. Spencer (University of East Anglia, UK)

Using fNIRS and DFT to understand how working memory capacity changes in early development

Visual working memory (VWM) is a core cognitive system with a limited capacity. VWM capacity limitations have been observed in a variety of clinical populations. Thus, understanding the early development of VWM capacity limits may be critical to intervention efforts with at-risk children. In this talk, I will bring together two innovative techniques to examine the neural mechanisms that underlie changes in VWM capacity. In the first part of the talk, I will use Dynamic Field Theory to examine changes in VWM capacity in early development. Here, I will focus on recent work by Simmering (2016) who demonstrated that an integrated VWM system underlies the differential emergence of capacity limits in two tasks—a preferential looking task with infants and a change detection task with 3 and 4-year-olds. I will then use image-based fNIRS to test this theoretical claim. In particular, I will report data from a task-based neuroimaging experiment with 3- and 4-year-olds where children completed both tasks while being scanned. Results are consistent with the theoretical model in that a common VWM system was activated in both tasks. The discussion will focus on pushing this work to the next level using a model-based fNIRS approach.

PAPER ABSTRACTS

Wednesday, September 5, 2018

SESSION 1: ADVANCES IN INFANT MEASUREMENT SCALES

Samuel Forbes and Kim Plunkett

Toddlers' visual closure in colour vision testing

A common issue in colour vision and colour word research in infants, is the exclusion criteria for participants who may have colour vision deficits. In adult research, participants are usually tested with a standard battery of colour vision tests, but there are no standard tests available for infants 3 years and younger. Infant research thus often falls back on estimates based on family history.

We investigate the feasibility of a potential prototype for a colour vision test, for toddlers in their second year of life. The stimuli for this study are made up of modified, Ishihara-style pseudo-isochromatic plates, presented in colours that should not be affected by vision impairments, with the aim of assessing whether stimuli presented in this fashion are visible to toddlers at 16 to 19 months of age. Participants were assessed with a forced-choice eye-tracking procedure, examining looking to the target and a distractor after hearing the name of one of the objects presented.

The results demonstrate that stimuli presented in this manner are noticeable by toddlers at these stages of development, with both age groups systematically identifying the targets when the object label was known. However, the 16-month-olds were much slower to identify the target than the 19-month-olds, suggesting that they found the task more complicated than the 19-month-old participants.

The findings indicate that pseudo-isochromatic plates may be used at these ages to assess colour vision. The slower response time at the younger age group indicates the possibility that visual closure is still developing around that age. This perceptual development, in concert with vocabulary constraints, demonstrate that such a task would not be appropriate with younger age groups.

Julien Mayor and Nivedita Mani

A short version of MacArthur-Bates Communicative Development Inventories of high accuracy

MacArthur-Bates Communicative Development Inventories (CDIs; Fenson et al., 2007) are one of the most widely-used evaluation tool of early language development. CDIs are filled in by parents or caregivers of young children by indicating which of a pre-specified list of words and/or sentences their child understands and/or produces. Despite its success, its administration is time-consuming and can be of limited use in clinical settings, multilingual environment or when parents possess low literacy skills. We present a new method in which an estimation of the full-CDI score is obtained by combining parental responses on a limited set of words randomly sampled from the full CDIs with vocabulary information extracted from the WordBank database (Frank et al., 2017), sampled from age-, gender- and language-matched participants. Real-data simulations using CDI-WS for American English, German and Norwegian as examples revealed high accuracy and reliability of the instrument even for tests having just 25 words (see Figure 1), effectively cutting administration time to a couple of minutes. Empirical validation with new participants confirmed the robustness of the test. Beta versions of an app (available for iOS and Android) and of a web-interface implementing the instrument are currently being tested and will be made available for researchers over the coming months.

SESSION 2: LANGUAGE DEVELOPMENT I

Nayeli Gonzalez-Gomez, Frances O'Brien, Sheula Barlow, Sharon Baug and Margaret Harris

Early phonological development in preterm babies and babies from lower SES families

Two major developmental trajectories have been identified as markers of infants' specialisation on their native language. First, there is an increase in infants' ability to process native sounds and consequently, a preference emerges for the sequences that are either legal or have a high frequency of occurrence in their native language. Second, infants' ability to process non-native sounds decreases over time, a process known as perceptual narrowing. These processes of learning have been assumed to be "universal". However, the vast majority of developmental studies have relied on "convenience samples", consisting of full-term infants from higher-SES families, which are, for the most part, unrepresentative of the larger population. There is, thus, no evidence as to how much the time course of learning is affected by maturational and environmental factors.

The present project addresses this issue. We investigated early phonological development in cases where: a) maturation is following an altered timetable: preterm infants; and b) the environment is different: infants from lower-socio-economic status families. The linguistic abilities of both populations have been found to lag well behind their advantaged peers during the school years.

Three longitudinal studies explored infants' phonetic, prosodic and phonotactic development, respectively, at 7.5, 9, 10.5 and 12 months of age. Preliminary analyses for 40 infants showed no significant differences between the phonetic or the phonotactic development of the preterm and the full-term infants. However, a time-lag between preterm and full-term developmental timing for prosody was found. Socioeconomic status didn't have a significant difference on prosodic or phonetic development. Nevertheless, phonotactic development was affected by SES, infants from lower SES showed a preference for high-frequency sequences later than their more advantaged peers. Overall these results suggest that different constraints apply to the acquisition of different phonological subcomponents.

Jill Lany

Individual differences in infants' nonadjacent dependency learning

There is considerable controversy over whether infants' ability to learn statistical regularities is relevant to learning grammar. English-learning infants are sensitive to simple nonadjacent dependencies (NADs) in their native language by 18 months (e.g, distinguishing between "Everybody is baking" and "Everybody can baking"). Work with artificial languages suggests that invariant statistical regularities between nonadjacent words promotes learning: By 15 months, infants exposed to strings of the form pel X rud and vot X jic learn that pel predicts rud (but not jic) when many unique Xs can occur (i.e., pel X1 rud, pel X2 rud, ... pel X24 rud). However, the extent to which performance on artificial-language learning tasks is relevant to native language development has been extensively debated.

Using a longitudinal design, we tested whether infants' (N = 48) performance on this artificial-language task at 15 months is meaningful by 1) asking whether it predicts sensitivity to native-language NADs at 18 months, and 2) asking whether it is predicted by how much infant-directed speech (IDS) they heard at 12 months. Consistent with previous reports of sex differences in NAD learning, we found sex differences in how NAD-learning at 15 months was related to the other key measures. For females, hearing more IDS was positively related NAD learning at 15 months, which was in turn related to greater sensitivity to native language NADs at 18 months. However, males'

performance on the NAD-learning task at 15 months was unrelated to how much IDS they heard or to their sensitivity to native language LDDs.

These findings suggest that infants' ability to learn NADs in an artificial language is relevant to their native-language development, at least in females. They also suggest that investigating sex differences in NAD-learning may hold promise for understanding how environmental and cognitive factors interact to support language learning.

Luca Onnis and Erik Thiessen

Language-specific statistical computations in adults and infants

Adults' linguistic background influences their sequential statistical learning of an artificial language characterized by conflicting forward-going and backward-going transitional probabilities (Onnis & Thiessen, 2013). English-speaking adults favor backward-going transitional probabilities, consistent with the head-initial structure of English. Korean-speaking adults favor forward-going transitional probabilities, consistent with the head-final structure of Korean. Using a preferential looking paradigm, the current experiments assessed when infants develop this directional bias. Seven-month-old infants showed no preference for forward-going or backward-going regularities. By 13 months, though, English-learning infants favor backward-going transitional probabilities over forward-going transitional probabilities, consistent with English-speaking adults (Figure 1; Thiessen & Onnis, 2018). This indicates that statistical learning rapidly adapts to the predominant syntactic structure of the native language. Such adaptation may facilitate subsequent learning by highlighting statistical structures that are likely to be informative in the native linguistic environment.

SESSION 3: DYADIC INTERACTION

Sam Wass and Victoria Leong

Inter-personal neural synchrony and neural responsivity: How mature brains scaffold immature brains during shared parent-child play

Almost everything we know about how attention 'happens' in the brain has come from studying individuals in isolation. However, much early attention and learning – in particular, most early cognitive learning - takes place during shared attention with a social partner. Although previous research has investigated how an individual's endogenous brain oscillations relate to that individual's behaviour, relatively little previous research has investigated the neural mechanisms by which attention is dynamically shared between two individuals during social interaction.

We present findings from two papers that examine this question. In the first, typical 8-month-old infants interacted with an adult reciting nursery rhymes in two conditions: direct gaze and indirect gaze, while dual EEG was recorded. Bidirectional Granger-causal influences between the brains of infants and adults engaged in social indirection were observed in the Theta and Alpha bands, that were stronger during direct relative to indirect gaze. Infants vocalised more frequently during direct gaze, and individual infants who vocalised longer elicited stronger synchronisation from the adult.

The second study examined the neural mechanisms by which interpersonal and social influences act on attention. We recorded dual EEG from typical 12-month-old infants and parents during solo play and joint play. During solo play, fluctuations in infants' Theta power forward-predicted their subsequent attentional behaviours. But this forwards-predictiveness was lower during joint play than solo play. Granger-causal analyses also suggested that parents' brains dynamically responded to their infants' attentional shifts and that, where the parent is more responsive, the infant is more attentive.

We conclude by discussing new insights that these findings offer into how partners influence another during social interaction.

Amy Bidgood, Lewis Ball, Samantha Durrant, Michelle Peter, Julian Pine and Caroline Rowland

Symbolic play and language development in the Language 0-5 Project

Children begin to pretend in play around their first birthday, beginning with very simple actions such as 'drinking' from an empty cup. In the following months, pretend play becomes more complex, and starts to become symbolic, with children substituting one item for another (e.g. a banana for a telephone). Symbolic play has been linked with several aspects of cognitive development, including language development. This relationship is particularly interesting as language is also symbolic, with words (sequences of sounds, in spoken language) representing concepts.

To investigate the play-language relationship with a large sample, we use data from The Language 0-5 Project, which follows 80 typically-developing children from 6 months to 4½ years, investigating various aspects of language, cognitive and socio-cognitive development. At 18, 24 and 30 months, parent-child dyads were filmed playing with toys chosen to elicit pretend/symbolic play (e.g. a teddy bear, a tea set, wooden blocks). Sessions were coded offline for the level of symbolism in the child's play and the time they spent in pretend/symbolic play. We tested whether either of

these measures related to children's concurrent vocabulary levels, and whether they predicted future vocabulary.

Findings revealed significant correlations between spontaneous pretend play level and concurrent vocabulary, both expressive and receptive, at 18 and 24 months, and between time in pretend play and concurrent vocabulary at all three ages (expressive only at 18 months; expressive and receptive at 24 and 30 months). Regressions show that both pretend play measures also predict future vocabulary, when entered into models on their own. However, initial vocabulary levels are much stronger predictors: when added into the models, they negate any apparent predictive value of play. Our results suggest that language and symbolic play develop simultaneously, possibly driven by a third factor, such as parental interaction.

Thursday, September 6, 2018

SESSION 4: BILINGUALISM

Julien Mayor, Jun Ho Chai, Hui Min Low and Tze Peng Wong

*Is the relative distribution of verbs and nouns modulated by socio-cultural influences?
Evidence from bilingual infants and toddlers in Malaysia*

Early vocabularies in most languages tend to contain more nouns than verbs. Yet, the strength of this noun bias has been observed to vary across languages and cultures. Two main hypotheses have aimed at explaining such variations; either that the relative importance of nouns vs. verbs is language-specific, or that socio-cultural influences shape early vocabulary structures. The present study compares the relative distribution of verbs and nouns, in English, between two groups of bilingual infants and toddlers; Malay-English and Mandarin-English. We found that early English lexicons of Mandarin-English bilinguals contained more verbs than in the English lexicon of Malay-English bilinguals, in both comprehension and production. Our results thus suggest that the noun-friendliness of a language can be modulated by factors external to that language.

We discuss the potential role of socio-cultural influences on the vocabulary structure in young users of a language; that the attentional patterns in parent-infant interactions modulate the structure of early lexicons.

Annika Unger and Barbara Höhle

Bilingual early word segmentation: Evidence from infants acquiring French and German

Since speech is continuous and does not contain inter-word pauses, word segmentation is one of the most challenging tasks infants have to face when acquiring their native language. Research shows that prosody facilitates infants speech segmentation (Jusczyk et al., 1999), though the use of prosodic cues is language-specific (Polka & Sundara, 2012). Infants growing up bilingually, especially with rhythmically different languages, face a distinct challenge to segment both languages efficiently as this involves a language-dependent adjustment of segmentation procedures (Polka et al., 2017).

In the current study, looking at German-French Bilinguals (9-12 months old), segmentation of bi-syllabic words was tested with the head-turn procedure in a dual-language task (Polka et al., 2017), testing infants with both languages (German; French) within the same test session. They were familiarized with text passages and tested with two word lists: familiar words vs. novel (non-familiarized) words. We provide evidence for early word segmentation in both languages (German; French) as bilinguals looked longer to the familiarized words compared to the novel words ($p < .001$) in each language. The results suggest that infants acquiring two rhythmically different languages have different language-dependent segmentation procedures: a syllable-based for French and a stress-based for German.

SESSION 5: COGNITIVE DEVELOPMENT

Osman Skjold Kingo, Trine Sonne and Peter Krøjgaard

Does the storyline matter? Eighteen-month-olds' memory for movies

In a recent visual-paired comparison (VPC) study (blinded, 2015) we showed that 18-month-olds remembered a short movie (30sec) with a simple storyline after two weeks. At Encoding, participants saw one of two movies, and at Test we found a familiarity preference. Vocabulary analyses suggested that the infants' understanding of the movie storyline affected their memory. However, an alternative interpretation might be that the infants simply remembered the movie due to the distinct perceptual details (e.g., color or luminance).

Here, to disentangle these interpretations we compared 18-month-olds' ($n=64$) memory for short movies either with a meaningful storyline (as above) or with perceptually equivalent movies without such meaning. Infants were assigned to a

Normal Condition, replicating the design from the recent study (blinded, 2015) or a Pixelated Condition (98% pixilation). Pixilation ensured that while making the agents, objects, actions, and settings unintelligible, the overall color scheme, movement, duration, and luminance was preserved.

Proportional Looking-time to the familiar/novel movie was compared to chance level. For the Normal Condition we replicated our previous findings (blinded, 2015) as eye-tracking data revealed a familiarity preference. For the Pixelated Condition, however, no memory was indicated since proportional looking-time never differed from chance (all p s > .4).

However, infants may have remembered the movies in the Normal Condition because of the static conceptual information (i.e. scenarios, agents or objects), and not because of the storyline. To disentangle these two interpretations, we are currently conducting a control experiment ($n=32$): The two movies are broken down to 1sec segments and presented in randomized order. Consequently, the storyline is disrupted while preserving the static conceptual information. Results are pending but will be available for the conference. Regardless of the outcome, the results will shed light on which aspects of the movies that are crucial for remembering.

Isabel C. Lisboa, Daniel Basso, Sandra Queirós, Jorge A. Santos and Alfredo F. Pereira
3 months-old' preferences for human motion configuration and its subsequent decline

There is an early distinctive sensitivity to the motion of animate beings, biological motion. Neonates prefer to look at a canonical point-light-display over random or inverted motion; however, when a spatially scrambled control is used, newborn's preferences disappears. In a spatially scrambled display the individual dot's motion is maintained but the coherent human motion configuration is disrupted. The aim of the present experiments was to ascertain if and when a preference for either stimuli arises in infancy.

In the first experiment, two groups of infants were tested in a preferential looking procedure: $N = 25$, 3-months-old ($n = 15$) and $N = 20$, 5-months-old ($n = 12$). Infants viewed two point-light-walkers (PLW): (1) a canonical (2) and a spatially scrambled version (scrambled PLW). To assess the differences in mean looking time at both stimuli, we conducted a one-way ANOVA. Preferences varied with age ($F(1, 25) = 5.44$, $p = 0.028$) but with 3-months-old spending more time looking at the canonical PLW and 5-months not. On the second experiment, we used a longitudinal sample ($N=24$, $n= 17$) and measure a new age, 7 months. A repeated measure ANOVA determined that the mean proportion of looking at the canonical PLW was significantly different

across the three age groups ($F(2, 27)=60.32, p <.0001$). Turkey post-hoc comparisons revealed that 3 months old looked significantly longer to the canonical stimuli in relation to 5 and 7 months.

These results are unexpected since we did not observe an increased preference, across developmental age, towards the canonical PLW. We hypothesize that at 5-months both stimuli are perceived as two competing motions, without any inherent categorization (e.g. as human vs. non-human). The two stimuli also differ in terms of complexity, with the canonical having higher configural coherence – and differences in complexity seem to affect infant's preferences.

Tamar Keren-Portnoy, Helena Daffern, Rory Depaolis, Kenneth Brown, Christopher Cox and Florence Oxley

Six-month-olds learn to operate an app with their voice

This study investigated whether infants can learn the contingency between their vocalisations and a non-social external event. Rovee-Collier (1997) showed contingency learning in her memory studies: She fastened infants' ankles to a mobile which turned when they kicked, or positioned them in front of a lever, which made a train move when they banged on it. Learning was evidenced by an increase in the frequency of the motoric action (banging, kicking). We set out to design an event which will co-occur with infant vocalisations. Our eventual aim was to create a tool for research or intervention that encourages infants to vocalise more. To this end we created an app, BabblePlay, that shows colourful moving shapes on a screen when the infant vocalises.

BabblePlay was tested with 60 6-month-old infants, 30 each in the experimental and control group. Infants' vocalisations were measured during 5 minutes of solitary play followed by a 5-minute session with BabblePlay or, in the control group with a non-responding app whose display was not contingent on the infant's vocalisations. Each control-group infant was yoked to an experimental-group infant and shown the 'film' of moving shapes created by that experimental-group infant's vocalisations. An ANOVA comparing the number of vocalisations in the first half (2.5 minutes) to those in the second half (2.5 minutes) of the app session, showed a significant interaction ($F(1, 29)=6.17, p =.019$). The infants in the experimental group increased their vocalisations between the first and second half of the session ($t(29) = -5.529, p < .001$), whereas the control-group infants did not. The difference between the groups, whose participants saw the same displays, suggests that infants in the experimental group increased their vocalisations in order to 'create' more shapes, rather than in response to the appearance of shapes on the screen.

SESSION 6: ADVANCES IN EYE-TRACKING METHODS

Sylvain Sirois

What matters more than where: Infant pupil dilation and gaze location

In the past decade, research on infant cognitive abilities has shifted from a primary reliance on looking-time measures (Aslin, 2006) to a combination of measures obtained from eye tracking: gaze, pupil dilation, and eye blinks (Eckstein et al., 2017). Pupillometry itself has many advantages over looking times; notably, its sensitivity to the temporal dynamics of experimental events (Jackson & Sirois, 2009). However, eye-tracking systems can introduce pupil diameter estimation errors as a function of point-of-gaze (Brisson et al., 2013). This may be especially problematic for studies where the screen location of key stimuli can introduce arbitrary differences in pupil diameter, confounded with experimental manipulations.

In this paper, we report on a dense examination of pupil diameter estimates from a study on infant social cognition (Gustafsson et al., 2015). Thirty 12-month-old infants watched social interactions between two human agents for a minimum of 6 habituation trials, and 4 test trials. All trials involved one agent talking about one of three toys in front of both agents. Test trials manipulated which agent spoke (familiar or novel) and whether agents exhibited joint or divergent attention.

Pupil data were processed to fill gaps from eye blinks and head turns using the method from Jackson and Sirois (2009). In total, 184373 pupil samples with valid X and Y gaze values (i.e., infants were looking at the screen) were analysed. For each infant, an overall baseline pupil diameter was computed from all his or her samples. Significant changes in pupil diameter from baseline are primarily clustered on task-relevant screen locations. Looking specifically at the horizontal and vertical distributions of gaze values, we observe no systematic effect of gaze on baseline-corrected estimates of pupil diameter. The discussion focuses on how task-evoked pupil dilation appears robust to known gaze-related biases.

Matt Hilton, Jie Ren, Silvana Poltrock and Barbara Höhle

Using eye-tracking to measure individual differences in cognitive functions during infancy and early childhood

We introduce a unique battery of eye-tracking tasks adapted from existing paradigms (Kovács & Mehler, 2009; Rose, Feldman & Jankowski, 2004). These tasks are designed to examine the role of critical cognitive abilities in the development of language and social skills. The tasks have been implemented in six developmental research labs

across Germany as part of the Crossing the Borders research group (DFG research group 2253). Children aged 12, 24 and 36 months were tested on their processing speed, cognitive control, recognition memory and sustained attention, measured by recording looking behavior when presented with familiarized and novel stimuli. All children who visited a participating lab were invited to complete the task battery and standardized assessments of children's cognitive and linguistic development (e.g. Bayley scales of development, vocabulary questionnaires). Taken together, the data will provide an in-depth examination of the reliability and stability of individual differences in these cognitive abilities during the first three years of life. Furthermore, the multi-lab implementation of the task will enable us to test a large sample of children (N so far > 300). All materials related to the task (scripts, stimuli and final dataset) are to be available publicly, allowing the research community to make use of the battery as a measure of individual differences in these early cognitive abilities. Here, we will present an overview of the tasks and the data that will be made available, alongside an insight into initial analyses and their implications.

Han Ke, Gert Westermann and Katherine Twomey

New evidence for systematicity in infants' curiosity-driven learning

Decades of research demonstrate that infants' learning is sensitive to task features. However, what level of complexity best supports learning is unclear. Moreover, infancy studies typically employ carefully-designed experiments with complexity determined a priori. Whether infants systematically generate a particular level of difficulty during everyday, curiosity-driven exploration is therefore unknown. Twomey & Westermann's (2017) model of visual curiosity-driven learning predicted that infants will generate intermediate task complexity (cf. Kidd, Piantadosi & Aslin, 2012) but to date this prediction has not been tested.

In the current work, we explored the possibility that infants will systematically prefer intermediate task complexity when allowed to freely explore a set of 3D objects. To test this hypothesis in a naturalistic environment, we developed a shape priming paradigm using 3D-printed toy-like stimuli and head-mounted eyetracking. Twelve- (N=18), 18- (N=18) and 24-month-old (N=18) infants were tested. Stimuli were sets of 3D-printed stimuli. Stimulus edges differed in a continuum from corners to rounded. Differences between exemplars were manipulated such that each object was perceptually distinct from every other object, but differences between successive stimuli in the continuum were controlled. Infants were presented with a single 'prime' object from a set for free exploration, followed by the full remaining set. Infants' first touches and subsequent exploratory sequences were coded offline.

Data show that regardless of age group infants show an identical pattern of object selection, first selecting exemplars of greatest perceptual difference from the prime. Cluster analysis demonstrated that overall infants exhibited 2 or 3 exploratory styles, generating either high-intermediate or low-intermediate complexity sequences. Overall, this study offers new evidence that infants as young as 12 months actively impose structure on their learning environment outside the constrained lab environment.

SESSION 7: SOCIAL COGNITION AND LANGUAGE

Marianna Jarto, Johanna R  ther, Aylin K  ntay and Ulf Liszkowski

Developmental relations between early social-cognitive abilities

According to Csibra (2003), action-understanding and communicative-understanding are two separate systems in infants' first year of life. Others are interpreting both as goal-directed action (e.g. Woodward & Guajardo, 2002; Sodian & Thoermer, 2004). Further, they are often either assessed with interaction-based measures or eye-tracking measures. First, we tested if these different socio-cognitive abilities are interrelated in early development. Second, we examined the relation of infants' visual processing of social actions and their behavioral abilities in social interactions. We conducted eye-tracking as well as interaction-based experiments monthly between 8 and 12 months in a longitudinal design. For the interaction-based tasks, we find robust correlations between point-following and helping behavior ($r=.482$) especially at 12 months, when half of the infants are showing helping behavior. For the eye-tracking tasks, there were no relations between the latency from a pointing-cue to an occluded referent in a cueing paradigm and goal-anticipation for a failed reach. However, looking-time in incongruent trials of the cueing paradigm (as an indicator for referential-expectation) was related to infants' action-anticipation. Between interaction-based tasks and eye-tracking tasks, looking-time (but not latency) was related to infants' point-following behavior in live interaction. There were no relations between goal-anticipation and helping behavior. Thus, we conclude that communicative- and action-understanding are partly related in development: the relation was more pronounced in infants' social behavior than in their visual processing. A referential understanding of the pointing gesture relates to point following behavior in live situations. However, the missing correlation between infants' goal-anticipation and their helping behavior suggests that interactional tasks may involve additional components (e.g. social motivation). The study reveals more relation than a disunity, rather supporting a one system view. Differences in measures might suggest that they measure distinct aspects of infants' abilities, or they may also indicate less consolidated competencies in the emergent skills.

Ditte Boeg Thomsen, Anna Theakston, Birsu Kandemirci and Silke Brandt
Perspective-marking language and false-belief reasoning in 2-to-3-year-olds

Building up a flexible understanding that one's own and others' mental representations of situations can differ from reality is an important step in young children's sociocognitive development. Previous research suggests that this development is facilitated by children's acquisition of the complement-clause construction, a type of perspective-marking syntax where one clause (e.g. "My drawing is ugly") is embedded in another clause (e.g. "He says"), as in "He says [my drawing is ugly]". This construction allows speakers to communicate about viewpoints they themselves do not endorse, and de Villiers & de Villiers (2000) proposed that complement clauses offer children a representational tool for reasoning about false beliefs. A host of studies have supported this hypothesis (e.g. de Villiers & Pyers 2002, Low 2010), yet there are critical uncertainties regarding the correlations reported. Crucially, most studies do not measure complement-clause comprehension and false-belief understanding independently, as they use complement clauses in their false-belief questions. Second, few studies include measures of executive functions (e.g., inhibition, memory), making it impossible to exclude that complement comprehension and false belief correlate because success with both depends on the same executive-functioning skills.

To investigate whether complement-clause mastery still explains variance in performance on explicit false-belief tests when these are free from complement clauses, and when a series of background measures are controlled, we tested 48 2-to-3-year-olds (M: 37 months). The results provide strong support for the hypothesized language-cognition relationship, as they confirmed an independent role for the comprehension and production of complement clauses in explaining false-belief reasoning, when vocabulary, grammar, rule-switching flexibility, inhibitory control, working memory and implicit false-belief understanding (anticipatory looking) were controlled. To determine direction of causality in this close relationship between complement-clause mastery and false-belief understanding, we will re-test both after six months and discuss these longitudinal data with data from a complement-clause training study.

Friday, September 7, 2018

SESSION 8: DEVELOPMENTAL DISORDERS

Hanna Alonim, Hillel Braude, Ido Lieberman and Danny Tayar

Identifying variables associated with the prodrome of Autism during the first year of an infant's life

While there are as yet no clear biological markers for ASD, evidence exists for the presence of behavioural markers for autism already within the first year of life. However, there is still a great deal that is unknown regarding the prodromal development of autism, early behavioural variables, and the effects of early intervention. Aims to describe a pioneering study conducted assessing variables associated with autism in early infancy.

This study conducted at the Mifne Center examined 110 infants between the ages of 3-15 months who were eventually diagnosed with autism at the age of 2-3 years. Retrospective analysis was conducted of video-recordings of the first months of their lives made by their parents before any suspicion concerning defective development arose. Clips of parental home videos of infants during their first year of life will be included in this workshop presentation.

Eight variables associated with the prodrome of autism during the first 15 months of life were identified. These include: excessive passivity, excessive activity, lack of eye contact, lack of reaction, refusal to eat, aversion to touch, motor development delay and head circumference. The results from this study form the basis of the "Early Signs of Pre-Autism Screening in Infants" (ESPASI) screening instrument suitable for infants between 5-15 months.

Symptoms associated with the prodrome of autism may be identified in the first year of life. A therapeutic imperative exists for early assessment and intervention for infants with the prodrome of autism from around the age of twelve months. The ESPASI presents an early screening tool to detect autism in infants between 5-15 months, though its widespread clinical application still requires further validation.

Charleen List, Ben Ambridge, Elena Lieven and Julian Pine

Testing two different models of verb-marking error in children with Developmental Language Disorder and language-matched controls

The aim of this study was to test two different models of the pattern of verb-marking error in German-speaking children with Developmental Language Disorder (DLD) and language-matched controls. According to the (Extended) Optional Infinitive ((E)OI) Hypothesis (Wexler, 1994) children's verb-marking errors reflect a stage in which their grammars allow non-finite forms in contexts in which finite forms are required. Children with DLD produce OI errors at higher rates than both age-matched and language-matched controls. According to the Dual-Factor Model (Freudenthal et al., 2015), children's verb-marking errors reflect the learning of infinitives from compound finite structures in the input.

In order to test these models, a verb-elicitation experiment was designed and conducted with a group of 50 German-speaking children with DLD (3;0 to 5;6) and a group of 50 language-matched controls (2;0 to 2;11). This study involved eliciting a range of verbs which occurred in two different conditions: a simple-finite condition (e.g. 'Lisa builds a tower. Peter ... ') and a compound-finite condition (e.g. 'Peter can a house build-INF. Lisa ... '). The critical predictions of the study were that a) children with DLD would make more OI errors than language-matched controls and b) both groups would make more OI errors in compound-finite than in simple-finite contexts. To test the models' predictions the rates at which the children produced correct responses were entered into a 2x2 Mixed ANOVA. The results show a significant main effect of condition, with higher rates of correct responses in simple-finite contexts and no significant main effect of group. These results count against the EOI Hypothesis, since they fail to show higher rates of OI errors in DLD children than in language-matched controls. On the other hand, they are broadly consistent with the Dual-Factor Model, since they show higher rates of OIs in the compound-finite condition.

SESSION 9: LANGUAGE DEVELOPMENT II

Paul Ratnage, Thierry Nazzi, Lionel Granjon and Caroline Floccia

The impact of phonetic and intensity changes on word recognition in British English-learning 5-month-olds

The division of labour hypothesis (Nespor et al., 2003) proposes that consonants are preferentially used over vowels when recognising and learning new words. However, cross-linguistic differences exist in the developmental trajectory of this consonant bias, based on the lexical and/or phonological properties of an infant's native language. For example, 5-month-olds acquiring French can detect vowel but not

consonant changes in their own name (Bouchon et al., 2015), whereas British English 5-month-olds appear to use energy information rather than phonetic differences in detecting consonant changes (Delle Luche et al., 2016). The present study investigated this further by using a head-turn preference procedure to examine if British English-learning 5-month-olds were sensitive to changes in a familiar word ('mummy') when either its phonetic information (i.e. changes in the initial consonant, /m/ to /n/, or vowel, /u/ to /e/) or its intensity (i.e. changes in the energy of the initial consonant or vowel) is altered. The results revealed a significant pronunciation x change x phoneme interaction ($p = .007$), suggesting that infants did not behave the same in all four subgroups. Planned comparisons found that infants could detect the vowel change in this familiar word ($p = .04$), but failed to notice the consonant change ($p = .11$). Moreover, infants did not appear to recognise changes in the energy of the initial vowel ($p = .09$) or the initial consonant ($p = .80$). The results suggest that British English infants rely on phonetic rather than intensity information when recognising a familiar word. Furthermore, British-English-learning infants appear comparable to French-learning infants in their development of lexical biases, with vowel, rather than consonant, changes affecting lexical recognition at 5-months. This supports the idea that in their first months, infants across languages are better at processing vocalic changes, even in word-related tasks (Bouchon et al., 2015).

Tom Fritzsche, Adamantios Gafos and Barbara Höhle

Is any type of input variability beneficial for mapping novel words to objects in 14-month-old infants?

Speaker variability has been found to aid in the learning of novel words (Rost & McMurray, 2009). Children can also profit from visual variability when learning new words (Twomey, Ma & Westermann, 2017). Both studies differed in the age groups, tasks, stimuli and measures. Therefore, the results are difficult to compare. This study investigates the effect of acoustic and visual input variability on word learning by using the same task. We ask whether input variability is beneficial because it highlights invariant perceptual features or whether there are differences between acoustic/phonological and visual information.

The first experiment was designed to replicate Rost and McMurray's findings with German-learning infants. We tested 34 fourteen-month-old children using the habituation-switch paradigm. During habituation two novel objects from the NOUN database (Horst & Hout, 2016) were presented with a pseudoword each (Fig. 1). Half of the children listened to only one token for each word (no variation), whereas the other half listened to 54 tokens from 18 speakers (variation). The test comprised of three trials: a correct object-word pairing (same), an incorrect pairing (switch) and a

new unknown object (novel). The results (Fig. 2) showed no differences in looking times for the no variation group ($p's > .48$) and for the variation group a trend for an increase between same and switch trials ($p = .07$). This replicates the overall pattern in Rost and McMurray's study.

In a second experiment, the visual stimuli were modified in size, orientation, distortion and background colour to yield 54 visual tokens for each of the objects. Currently, we are testing another group of 14-month-old children in a visual variation and a no variation group, both of which listen to only one acoustic token for each label. Findings from this experiment will be presented at the conference and discussed.

POSTER ABSTRACTS

Session 1: Wednesday, September 5, 2018

1. Limor Adi-Bensaid, Irit Feldman and Yossi Freier-Dror

The use of a parent-report questionnaire to examine the development of communication among 1- to 18-month-old toddlers with typical development

Background: Parental questionnaires are a reliable tool that can provide an accurate report on infants' abilities and development (Crais, 2011; Rosenberg, Bart, Ratson, & Jarus, 2013). Although the use of parental reports has increased, there is a shortage of questionnaires to examine communication development among babies even as young as 1 or 2 months old. Goal: The development and validation of a parent-report questionnaire to collect data on various aspects of 1- to 18-month old babies' communication abilities. Methods: The Toddler Communication Questionnaire (TCQ) includes 34 items that target the expected communication abilities of young children. The questions relate to five communication components: eye contact and reciprocity, understanding situations, gestures, imitation and the production of vocalizations. Data was collected from the observation of 187 infants ages 1-18 months. The TCQ was completed twice for each toddler: 1) by a parent and, 2) by two clinicians who viewed a partially structured video-observation of the parent-child interaction. Results: The internal consistency of the TCQ was very high ($\alpha = .98$) and moderate –high correlations were found between the five components of the TCQ ($.78 \leq r \leq .91$). Pearson's correlation revealed a high association between the parents and the external observers' evaluation ($r = .907$) and similarly intra-class correlation coefficients indicated a very high association between the scores of the two external observers ($r = .972$). Finally, Pearson correlation between the infant's age and the TCQ overall score was high ($r = .972$). Discussion: The findings support the reliability and the construct validity of the TCQ. This tool can be used to evaluate the communication abilities of toddlers ages 1- 18 months. Moreover, it can assist clinicians in providing guidance to parents to improve their toddler's communication abilities.

2. Jenny Gibson, Witold Orlik, Dianne Newbury, Peter Clough and Umar Toseeb

The relationship between early communicative environment and educational outcomes for children and adolescents with and without indicators of Developmental Language Disorder

There is an increasing body of literature suggesting that a child's early home experiences have an impact on educational attainment (e.g. Roulstone et al. 2011). Children with Developmental Language Disorder are at increased risk of poorer educational attainment and this may persist into adulthood (Conti-Ramsden et al, 2018). Using data from the UK based Avon Longitudinal Study of Parents and Children (ALSPAC) we investigated the relationship between early communicative environment and educational attainment in children with and without indicators of Developmental Language Disorder. We wished to explore whether mediating factors (either individual or social) between ECE and educational attainment could be identified, to highlight potential future targets for intervention. There were 471 children with indicators of Developmental Language Disorder at age 8 years, who were identified using direct measures of expressive and receptive language. This translated to a conservative prevalence estimate of 6%. Structural equation modelling was used to test the direct relationship between a child's early communicative environment (ECE; 0-24 months) and educational attainment in childhood and adolescence (11-14 years). ECE included measures of mother-child activities, mother teaching child, positive parenting, and literacy resources. The mediating role of individual and social factors at ages 5-8 years, as well as the moderating role of Developmental Language Disorder, was also tested. It was found that, as expected, early communicative environment was a significant predictor of later educational attainment in children with and without indicators of Developmental Language Disorder and this association was partly mediated by individual and social factors. These findings suggest that in the presence of a poor early communicative environment, it may be possible to ameliorate its negative effects on educational attainment through improving child-level and social factors.

3. Anastasiia Ogneva

On grammatical gender agreement: a study of Spanish-speaking children with Specific Language Impairment

Grammatical gender is reported to be acquired effortlessly by the age of three and is considered errorless in many languages with morphological

assignment rules like French, German or Russian (Grozdev, 1961, Karmiloff-Smith, 1979, Mills, 1986, Müller, 2000, Szagun, 2000). In Spanish, gender related information can be perceived from morpho-phonological, semantic or syntactic cues. Previous studies mainly focused on typically developing children's production of determiner-noun relations (Mariscal, 2008), the ability to evoke the correct gender of a noun (Pérez-Pereira, 1989) or to predict an upcoming noun from the determiner (Arias-Trejo & Alva, 2012, Lew-Williams & Fernald, 2007). Nonetheless, little attention was paid to children who exhibit problems acquiring language. The purpose of this investigation is to find out what strategy children with Specific Language Impairment use when assigning grammatical gender to nouns. A total of 40 (20 with SLI and 20 age-matched typically developing peers) Spanish-speaking children aged 4-5 will be assessed via an invented word task. A procedure similar to that of Pérez-Pereira (1991) will be employed. It is hypothesized that SLI children will make use of morpho-phonological and syntactic cues as the typically developing peers.

4. David Elliot

Assessment and post-treatment evaluation of absence epilepsy seizures

Gaining a diagnosis of epilepsy and effectively evaluating its treatment is currently costly, time consuming, and inaccurate, due to relying on inpatient recordings, manual data inspection, and patient self-reports. In the UK misdiagnosis rates are estimated at 20-30% at the cost of over 260 million pounds (NICE, Clinical Guidelines and Evidence Review for the epilepsies, 2011). Epilepsy is a lifelong condition, with many patients receiving several different antiepileptic drugs over the course of their lifetime, and 1 in 3 cases not responding to treatment at all. Some mobile technologies have started to be investigated to monitor seizures, however they rely on behavioural, rather than electrophysiological, markers. These can also be unreliable and not feasible for tracking seizures that do not manifest in gross bodily movements, such as absence seizures. Absence epilepsy is a neurodevelopmental disorder that can develop during childhood or early adolescence and constitutes around 10% of paediatric epilepsy patients. Absence, or petit mal, seizures are characterised by brief, bilateral 3Hz generalised spike-and-slow wave discharges of electrical activity generated from firing neurons, lasting around 9 to 12 seconds (Hughes, 2009). We have developed a portable EEG system, comprised of a wearable head band, and a companion android app for patient diary reports, assisting the assessment and post-treatment evaluation of these seizures. The overarching goal of the project is to develop techniques

for the automatic detection of seizures in both medical and portable EEG; additionally, investigating patient acceptability and adherence of active (recording a seizure diary) and passive (wearing portable EEG) seizure tracking methods, and comparing the cognitive abilities of absence epilepsy patients pre- and post-medication administration.

5. Hannah Wilson, Gavin Bremner and Peter Walker

Do infants expect that dark objects are heavy and bright object are light?

Research has shown that infants reach and transport objects differently depending on their expectation of weight. Objects which were anticipated to be heavier were approached more quickly and, when the object was lighter than expected, the object was lifted faster, higher, and with greater acceleration (Mash, 2007). The present study will examine whether infants selectively prepare for objects depending on visual features of material (fluff and sand) and brightness (black and white). If infants expect sand blocks to be heavier, we expect they will approach them more quickly and will also lift them higher and faster. Although arguably a less obvious cue to weight than material, adults have been shown to appreciate a correspondence between brightness and weight, in which darker objects are expected to be heavier (Walker, Francis, & Walker, 2010). If infants also make this correspondence, we expect that they will also show differentiated kinematics towards darker and brighter objects; approaching black blocks more quickly and lifting them higher and faster. Previously, infants have been shown to appreciate other correspondences across sensory modalities, such as they expect high pitch sounds to be located high in visual space (Walker, Bremner et al. 2010). The current study looks to expand our knowledge of infants' sensitivity to crossmodal correspondences, by looking at the brightness-weight correspondence, using a novel technique of motion capture analysis of kinematics.

6. Trinh Nguyen, Ezgi Kayhan, Hanna Schleihau, Daniel Matthes, Pascal Vrticka and Stefanie Hoehl

The Effects of Caregiving on Bio-Behavioural Synchrony in Mother-Child Interactions

Behavioural and affective attunement between caregiver and child are considered essential for attachment and emotion regulation (Stern, 1985). Previous research suggests that particularly sensitive caregiving is associated with behavioural and physiological synchrony during mother-infant

interactions (Leclère, 2014). With the recent advancements in hyperscanning the interpersonal coupling of brain activity is discussed as a neural underpinning of behavioural and physiological synchrony (Atzil et al., 2014; Leong et al., 2017). Here we present a dual functional near-infrared spectroscopy (fNIRS) study looking at the relationship between the quality of mother-child interaction during a problem-solving task and brain-to-brain synchrony. Our sample consisted of 36 dyads of mothers and children aged 5 to 6 years. Wavelet transform coherence was used to assess the cross-correlation between the two fNIRS time series. We conducted linear mixed models analyses with random intercepts and post hoc analyses corrected with Tukey's Honest Significant Difference. The results revealed a significant increase in brain-to-brain synchrony in the dorsolateral prefrontal cortex (dlPFC) and temporo-parietal junction (TPJ) when mother and child solved the task collaboratively instead of individually, $t(1340)=2.75$, $p=.02$. When working in collaboration, low and high behavioural reciprocity were related to low brain-to-brain synchrony, while intermediate levels of behavioural reciprocity were related to high brain-to-brain synchrony, $t(30)=2.00$, $p<.05$. This pattern was mostly driven by dyads in which children were not able to solve the task on their own. Additionally, higher levels of maternal responsiveness attenuated brain-to-brain synchrony in the TPJ, $t(1216)=2.61$, $p=.02$, whereas intermediate levels of child autonomy correlated with higher brain-to-brain synchrony in all regions of interest, $t(1216)=2.66$, $p=.02$. The findings indicate that equal task engagement of mother and child may facilitate brain-to-brain synchrony and highlight the complexity of neuro-behavioural synchronization between mother and child. The results will be further discussed in relation to attachment theory.

7. Leigh Keating

The Role of Shape Bias in 'Online' and 'Offline' Categorisation

From around 24-months old, children develop a tendency to categorise objects by their shape during word learning (shape bias). In most experimental research into shape bias, both the category exemplar and the test objects are visible at all times, allowing direct ('online') comparisons to be made. However, children's real-life category judgements are often made from internal representations ('offline'), without a known example present. This poster presents my planned research to investigate whether the shape bias is a consistent strategy that young children use in both online and offline tasks. If children do treat these tasks different, or they develop at different times, this will inform our understanding of how young children develop the

ability to generalise labels to previously unseen category members. Using a tablet based games, young children (aged 2-5 years) will be shown a novel, computer generated exemplar, and three test objects that match the original in colour, material or shape (see Figure 1 for example). Children will select which one shares a label with the exemplar using the touch screen. In one game the exemplar remains visible at all times, but in the other the exemplar must be learned first and judgments made from memory. This study is also to be conducted with children with Autism Spectrum Disorders (ASD), as there is conflicting evidence as to whether this group displays a shape bias during word learning. By comparing the responses from children with ASD to the typically developing group we hope to identify if shape bias is delayed or divergent in ASD. Conference delegates will have the opportunity to try the touch-screen games for themselves and view all of the stimuli created for this study.

8. Sabine Graetz and Sabina Pauen

To play or not to play... – Do children overimitate more in playful than functional settings?

The tendency to copy actions that are obviously irrelevant to achieve a given goal has been termed overimitation. Recent research on preschoolers revealed that overimitation is dependent on context factors: For example, children overimitated more in conventional settings compared to instrumental settings (Herrmann, Legare, Harris, & Whitehouse, 2013; Moraru, Gomez, & McGuigan, 2016). Play, as a context factor, has also been suggested to influence children's imitation behavior. In a diffusion chain study, four- and five-year-old children handed down irrelevant actions to the next child only if these actions had previously been demonstrated in a playful manner (Nielsen, Cucchiaro, & Mohamedally, 2012). In the current project, we explore how a playful context influences children's overimitation in a different paradigm. More specifically, we vary the context only via task instructions, we present standardized video demonstrations and we use a simple task with a causally transparent open mechanism. In the playful condition, the child is asked to take the role of a magician and to pilfer a treasure from a magic box. In the functional condition, the child is instructed to simply obtain items from a box. After seeing a video of an adult performing four irrelevant actions before obtaining an item, it is the child's turn. According to preliminary data children frequently overimitated in the playful context (13 out of 16 children). The high imitation rate of intransitive actions (e.g. clapping hands, moving a non-functional tool) is especially

interesting, because similar actions are rarely imitated in more instrumental contexts (e.g. Schleihauf, Graetz, Pauen, & Hoehl, 2017). Full data for both conditions will be presented on the poster. In addition, we collect information on children's playfulness and personality traits via parental questionnaires to identify which individual characteristics might influence children's tendency to imitate in different task contexts.

9. Alexia Revueltas

Exploring the relationship between engagement and learning: A new perspective

Engagement is a form of active participation represented as the degree of attention, curiosity, interest, and passion that is shown when someone is learning or being taught, leading to understanding the world. Engagement is often presented as core to learning, especially in early childhood, where children are more likely to be distracted by stimuli that are task-irrelevant. Engagement comprises three interacting components: behavioural, cognitive and emotional. However, whilst the behavioural component can be observed, the cognitive and emotional components are internal experiences and hence present challenges in how they are measured. Consequently, despite its recognised importance, it is still unclear what role engagement plays in learning along with the neural mechanisms underpinning it.

Neuropsychological tools like EEG, eye-tracking or skin-conductance-response offer ways to measure cognitive and affective processes not open to introspection or observation. Recent development in these tools could address challenges of measuring engagement and advance understanding of if and how its support learning. Moreover, these tools now can be applied outside the lab (e.g. schools or museums presenting valuable opportunities to examine complex constructs, such as engagement, as they occur in real-world contexts. Furthermore, the ability to use these tools with younger children could be valuable given the challenges of other forms of measurement, e.g. self-reporting. To date, limited studies have examined engagement using these methodologies, even less in early years learning contexts. This research project aims to attend this gap by exploring the feasibility and value of these methodological tools to examine the relationship between learning and engagement in the complex context of hands-on exhibits in early science centres. By providing a novel window into non-observable body-based this doctoral research supports a wider 3 year NSF/Wellcome Trust/ESRC funded project, Move2Learn, that explores the role of embodied interaction in early science learning in informal contexts.

10. Sriranjani Karthik, Eugenio Parise and Ulf Liszkowski

Looking beyond observed actions: Social communication changes the 'back-of-hand' gesture interpretation

Infant electroencephalography (EEG) studies on the understanding of goal-directed actions have hitherto focused on the classic object-directed, instrumental actions such as reaching and grasping. They found mu rhythm desynchronization around central scalp areas, corresponding to the motor cortex, for actions performed by the self and to those observed. However, contextual factors of goal attribution have rarely been investigated. Here we placed the back-of-hand gesture, typically used as control stimulus, either into a social context ascribing it a 'request' gesture, or into a non-social context, remaining meaningless. We asked whether social-contextual information could overturn an action interpretation from meaningless to meaningful. In doing so, we aim to provide support to the 'prediction theory' of action understanding and promote the notion that factors beyond the observed action or an available motor repertoire aid action interpretation. Low-density EEG was first recorded from adults. Participants watched videos of social and nonsocial situations where a person displayed the back-of-hand gesture. Infant EEG editing procedures were adopted with adult data to make the results from both groups comparable. Data from 9-month old infants are currently being collected and the results are expected by the time of the conference. We ran time-frequency analysis of the EEG to look at mu activity in both conditions. In the adult study, the repeated measures ANOVA revealed a main effect of time (baseline vs. test phase) and location, with greater mu desynchronization during the test phase in the parietal region. Further t-tests revealed a stronger mu desynchronization in the central and parietal channels for the social condition compared to the nonsocial condition. Only the social condition was significantly different from baseline. From the adult study, it is evident that the back-of-hand gesture is perceived as meaningful given the appropriate communicative context and we hypothesize similar results from the infant sample.

11. Rachael Cheung, Padraic Monaghan and Kirsty Dunn

Environmental effects on parental teaching and infant word learning

Infants begin pointing at objects in the presence of others at 11-12 months (Carpenter et al., 1998), and adapt to point in appropriate environments by

the age of two (O'Neill & Topolovec, 2001). Pointing may be used as an early word learning mechanism to gain information from others (Southgate et al., 2007). As language learning occurs in environments with multiple possible referents, pointing provides crucial information about the intended referent. Parental gestural cues are prevalent during this time, with Iverson (1999) reporting parental pointing during 15% of word learning exchanges. The quality of parental gestural cues also appears to boost word learning (Cartmill et al., 2013). In this study, 30 monolingual English-learning 18-24-month-olds will be taught three novel nouns for three novel objects by a parent. The number of foils presented with targets will vary across three conditions; a) one target object, b) one target object and one foil, and c) one target and five foils. Children will then be tested on novel object knowledge. During training, parental gestural and speech cues, including prosody and pointing, will be video recorded and analysed. During testing, accuracy of child object choice will be measured. We hypothesise that parents will initiate more pointing and speech cues when the target is amongst more compared to fewer foils. We also hypothesise that children of parents offering more cues will show better word learning performance. Early child gesture use has been found to be a significant predictor of future vocabulary size (Rowe, Özçaliskan, Goldin-Meadow, 2008); however, the mechanisms underlying the supportive role of gestures during early word learning are uncertain. By manipulating the number of possible environmental referents, this study investigates whether the immediate environment influences the frequency of parental cues during early word learning, and whether these cues translate into improved word learning.

12. Marina Bazhydai, Gert Westermann and Eugenio Parise

Preverbal infants' social referencing as information-seeking in situations of referential uncertainty

Social referencing is among the early communicative tools available to preverbal infants for seeking emotional guidance when uncertain, asking for help and placing instrumental requests (Walden & Ogan, 1988). In addition, social referencing may be one of the mechanisms for active information seeking (Goupil, Romand-Monnier, & Kouider, 2016; Koenig & Echols, 2003; Harris & Lane, 2014). We designed three experiments to understand whether in situations of referential uncertainty preverbal infants seek information through social referencing. In Exp. 1, 11-month-old infants (N = 32) experienced either congruent or incongruent object labelling events initiated by their caregivers. Contrary to our hypothesis, social referencing did not

increase in incongruent trials. One possible explanation for this result is that labelling occurred prior to the object becoming visible so that at the time of labelling there was no incongruence. To address this potential limitation, in Exp. 2, the object was labelled immediately upon being revealed. We also established a baseline for social referencing and added a new, non-informative (no label) condition. Again, contrary to the proposed information-seeking, selective use of social referencing (Stenberg, 2009, 2012; Striano & Rochat, 2009), infants did not differentiate their use of social referencing in congruent and incongruent conditions, but looked significantly less during the no label trials, prompting further exploration of this effect in Exp. 3. In a live, head-mounted eye tracker paradigm, 12-month-old infants were familiarized to two demonstrators (informant and non-informant). Following familiarization, test trials presented infants with the forced choice situation of referential uncertainty. When in need of relevant information, infants were more likely to selectively reference the informant rather than the non-informant. Together, this work provides detailed insights into the role of social referencing in early infancy beyond the classical emotionally driven accounts (Sorce et al., 1985).

13. Lyssa de Vries, Steffie Amelynck, Melinda Schaap, Ilse Noens, Gunnar Naulaers, Bart Boets and Jean Steyaert

Developmental trajectories in infants at high risk for ASD

Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition, often diagnosed after the age of three, but by definition, some symptoms have to be present before that age. Early detection seems difficult, because symptoms are diverse and subtle. In this study (part of a larger interdisciplinary project: TIARA, Tracking Infants At Risk for ASD), multimodal longitudinal data will be collected between 5 and 36 months to identify developmental patterns that could lead to ASD. Methods: Data will be collected in three groups of infants at high risk of developing ASD: 1) infants born before 30 weeks of pregnancy 2) infant siblings of children with ASD and 3) infants with feeding problems without sufficient somatic explanation. This population is different from previous research (e.g. by the BASIS network, EASE team, Baby Siblings Research consortium), where researchers mainly focused on the siblings. A broad range of data will be collected at 5, 10, 14, 24 and 36 months of age, including behavioral measures (individual measures such as eye tracking, but also mother-child interaction), neurophysiological data (electroencephalography (EEG), fNIRS), genetic and metabolic data. Results: Data collection is ongoing. I will investigate developmental

patterns of different parameters (yet to be selected from our range of data). We expect to find different subgroups within the ASD group, for example a group that shows regression, and a group that keeps developing but at a slower pace in certain domains. Besides the longitudinal research question, my focus will be on eye tracking: for example paradigms that focus on attention, preference for social vs non-social cues, pupil dilation, and on EEG: Event related potentials (ERP) to direct vs averted gaze, ERP to own name vs strange name, resting state connectivity. Discussion: Several limitations will be present: for example, recruitment could be biased and drop out is expected.

14. Ildikó Király, Katalin Oláh and Zsófia Válint

Expectations of shared cultural knowledge hinder children's false belief attribution

In this research project, we investigate the hypothesis that making sense of behavior depends on the interaction of two processes: a dynamic mentalizing process and a more rigid one that helps us make inferences about the background knowledge of others. To investigate the question, we applied the classic Smarties task. We tested 4-year-old children in two conditions. The Ostensive condition followed the classic procedure of the task where an experimenter presents children with a Smarties box and shows them that it contains pencils instead of chocolate. Then, children are asked what another person would think is inside the box. In the Non-ostensive condition, instead of showing children the contents of the box, the experimenter accidentally knocks it over, revealing the pencils inside. Our preliminary results suggest that children in the Non-ostensive condition were more likely to correctly attribute the belief to another person that the box contains chocolate (12 out of 21) than children in the Ostensive condition (8 out of 21). We suggest that this pattern of results can be explained by children's bias to interpret the information received in an ostensive context as part of shared cultural knowledge and this leads to an overgeneralization error.

15. Victoria Singer

Using Dynamic Assessment to Understand Word-Learning in Late Talkers

Between 13% and 20% of two-year olds are classified as Late Talkers (LT; Zubrick, Taylor, Rice and Slegers, 2007); of those, up to 25% are at risk of persistent problems (Paul and Ellis-Weismer, 2013). Whilst multiple risk factors (e.g. receptive delays in addition to expressive and poor imitation and

symbolic play skills) have been established (Paul and Roth, 2011), there is, to date, no definitive list or tool that can be used to differentiate those likely to 'recover' from those progressing towards a clinical diagnosis of Developmental Language Disorder (DLD). The current PhD study aims to build upon previous Masters' research (Singer, 2014) and combines the principles of dynamic assessment (DA) with models of infant word-learning in order to develop such a tool. A new play-based DA of single word-learning will be piloted with late talking (LT) and typically developing (TD) children aged 24-months. The DA will employ a graduated prompting format systematically manipulating socio-pragmatic and linguistic cues known to assist word-learning in TD children. The LT group will be tracked for a 12-month period with quarterly re-administration of the DA facilitating evaluation of the changing contributions of the selected cues over time. The DA's predictive validity and potential as a monitoring tool will also be explored through investigating associations between DA performance and catch-up gains on standardised static assessments. It is hypothesised that LT and TD performance on the DA at 24-months will be significantly different; however, LTs whose DA performance moves over time to more closely approximate that of the TD group will make greater catch-up gains and be more likely to be reclassified as Late Blooming. The project will have theoretical value in extending current multifactorial models of word-learning to include LT populations and clinical utility in guiding service delivery and most effective use of finite resources.

16. Pegah Athari and Susan Rvachew

Maternal vocal imitation in mother-infant interaction

It is well established that normally developing infants undergo an important developmental transition from pre-canonical to canonical (i.e., speechlike) babbling at sometime between 7 and 11 months of age. Theories of infant speech development tend to focus on innate biological mechanisms and the role of intrinsic motivation (Moulin-Frier et al., 2014) although environmental speech input is clearly essential to this developmental transition (Oller, 2000). Some theorists suggest that imitation of infant utterances alerts the infant to native-language speech categories in perception and production (Howard & Messum, 2014). Gros-Louis et al. (2006) observed that mothers were more likely to imitate CV syllables than other types of prelinguistic utterances produced by their infants. However, there are no studies that describe how maternal imitation supports infant speech development during the transition from pre-canonical to canonical speech. In this study, I recorded mother-

infant interactions in the laboratory at bimonthly intervals for 3 months from 7 infants who ranged in age from 6 to 11 months at the time of first recording. I am using chi-square analyses to examine the relationship between the likelihood of maternal imitation of the infant's utterance given characteristics of the utterance and the interaction. Thus far the data indicates that mothers tend to imitate their infant's vocalizations when they perceive them to be meaningful (M contingency coefficient = .31). The number of infant utterances that are perceived to be meaningful increases with age but the contingency coefficient does not increase with age. Maternal imitation was only related to joint attention when the infant's canonical babbling ratio is high. Maternal imitation was not contingent upon the infant's production of preferred forms. Maternal imitation was rare (occurring after 8% of infant utterances) but it may serve an important function nonetheless in supporting early exploration of the phonetic possibilities of the vocal tract.

17. Hye Jung Cho, Youjeong Park, Jinwook Kim and Naya Choi

Does children's observation of adult divergent thinking enhance their own divergent thinking?

Previous research has shown that adults' behaviors can impact young children's divergent thinking (e.g., Bonawitz et al., 2011; Hoicka et al., 2017). This study examined whether children's observation of adult divergent thinking would enhance their own divergent thinking in exploring novel toys. Study 1 (No Modeling condition) was conducted to determine relatively common versus uncommon exploratory behaviors that 3-year-old children could show while exploring the Unusual Box (Bijvoet-van den Berg & Hoicka, 2014). Seventeen 3-year-olds played with the Unusual Box and additional five novel objects, with no observation of an adult's exploratory behaviors with similar objects. In Study 2, 3-year-old children (N=44) were randomly assigned to two modeling conditions, and viewed an adult performing four different exploratory behaviors that had been shown by either more than 50% (Low Originality Modeling condition) or none (High Originality Modeling condition) of the children in Study 1. Following the observation, children played with the Unusual Box and five novel objects. Children showed the same level of fluency (i.e., total number of different actions performed) regardless of conditions (whether they had or had not observed the adult's exploratory behaviors, and whether they had observed low or high originality behaviors). However, the originality level (i.e., the relative rarity of actions performed) was significantly higher in children who had observed the adult's modeling (M

= 36.90, SD = 15.25 for Low Originality condition; M = 39.18, SD =13.59 for High Originality condition) than those who had not viewed the adults' modeling (M = 24.94, SD =12.74). The results suggest that socially observing others' exploring behaviors can facilitate children's divergent thinking (particularly the ability to yield original ideas for exploration), regardless of the originality of observed behaviors. Possible ways in which observation enhances divergent thinking are discussed.

18. Louah Sirri, Szilvia Linnert, Vincent Reid and Eugenio Parise

Are words more efficient than sounds in activating conceptual representations?

Lupyan and Thompson-Schill (2012) have shown that adults recognize faster a target image (e.g., cat) when it is preceded by a verbal (spoken word) compared to non-verbal cue (e.g., meowing), indicating that concepts are activated more effectively via labels compared to sounds. The present study aimed to replicate the adult findings and extend it to infants. Forty-four 9- and 38 12-month-old infants participated in a primed intermodal preferential (IPL) task in which they listened to either a word (e.g., cow) or sound (e.g., mooing) followed by an image on the eye tracker screen and illustrating a target and a distracter (e.g., cow - telephone). In addition, 31 adults completed a primed visual identification task during which we recorded reaction times for matching and mismatching target images. We successfully replicated Lupyan and Thompson-Schill (2012) adult findings showing faster reaction times to the target image when primed by matching than mismatching word or sound ($F(1,29)=65.95$; $p=.00$) with shorter reaction times in the word (575 ms) compared to the sound (590 ms) condition. However, both groups of infants did not shift faster their gaze to the target image compared to the distractor ($F(1,22)=3.67$; $p=.07$; $F(1,19)=0.04$, $p=.85$, respectively), in both conditions. Looking times ($n=29$ 9-month-olds and $n=29$ 12-month-olds) to the target image compared to the distractor ($F(1,28)=4.65$, $p=.04$; $F(1,28)=13.64$, $p=.00$), were longer in both the word and sound conditions, demonstrating a congruency priming effect. Our preliminary findings do not support the hypothesis that words activate conceptual representation more efficiently compared to non-verbal sounds in pre-verbal infants. At present, another group of 18-month-old infants is being studied to determine whether enhanced vocabulary skills influence conceptual activation.

19. Marina Loucaides, Katherine E. Twomey and Gert Westermann

The effect of labeling on infants' novel object exploration

The way in which infants explore objects in a dynamically complex everyday environment has been relatively little studied. Here we investigated how infants' object exploration is affected by the presence or absence of labels, and whether infants were allowed to handle the objects. This study used head-mounted eye-tracking to investigate how children at 24 months (N=24) interact with novel objects. Children sat on a high chair at a table across from the experimenter. They were assigned to a handling group, in which they handled objects for 30 s each, and to a no handling group, in which the experimenter handled the objects for 30 s. Within each of these groups half of the novel objects were labelled with novel labels, and half were unlabelled. After a five-minute break, the experimenter tested children's retention of label-object mappings by presenting the labelled objects and asking children for each in turn. Participants looked significantly longer at the objects in the no handling condition compared to the handling condition. Looking times to labelled and unlabelled objects did not differ in either condition. In both handling conditions, the looking at the objects, experimenters' face and the number of switches between objects and other areas of interest (experimenter's face and hands, parent's face and hands and child's hands) were not found to be significantly predicted by the children's productive vocabulary and whether the object was labelled or unlabelled. Children's productive vocabulary scores, looking time at labelled objects and switches during looking time at labelled objects were not found to predict retention of novel words in either condition. This research helps to enhance our understanding of early cognition by demonstrating how different environmental settings can influence children's interaction with objects and its relationship to word learning. Looking longer at the objects that children were not allowed to handle might be the way to communicate to their social partner their desire to handle the objects; a desire that might had been driven by the social partner's actions.

20. Steffie Amelynck, Lyssa de Vries, Melinda Schaap, Sofie Vettori, Chiara Bernagie, Bieke Bollen, Guy Bosmans, Jean Steyaert, Ilse Noens, Bruno Rossion, Els Ortibus, Gunnar Naulaers and Bart Boets

Assessing socio-communicative sensitivity in at-risk infants with fast periodic visual stimulation

Infants communicate with others by ‘reading’ faces. They discriminate familiar from unfamiliar faces, and derive information about their feelings and intentions. Preterm infants and siblings of children with ASD are at risk for socio-emotional difficulties and an increased prevalence of ASD. Therefore, detailed monitoring of early socio-emotional development in high-risk populations is a valuable avenue for early detection and prevention of future psychopathology. Methods used in previous studies are generally complex, inconclusive and time-consuming. Here, we apply the frequency-tagging EEG approach, combined with eye-tracking. This approach is reliable and robust, and allows obtaining data without complex analyses. In particular, we investigate the visual preference and neural saliency of social versus non-social information (experiment 1), and of the mother’s face versus a stranger’s face (experiment 2), and examine longitudinal associations with the development of socio-communicative skills and attachment style. The first experiment shows two streams of natural images of various objects at 6 Hz presentation rate, with natural face images appearing in one of the streams at 1.2 Hz oddball rate. Sensitivity for detecting the social (face) information is quantified by the EEG-amplitude at the oddball frequency and reflected in the eye-tracking data. The second experiment presents two faces simultaneously (mother and stranger), each labelled with a different presentation rate. Thus by quantifying the EEG responses corresponding with the particular frequencies of stimulation, we can quantify the preferential neural processing of the concurrent visual inputs. We expect high-risk infants to show less preference for social stimuli, for the face of their mother versus a stranger’s face, and to pay less attention to the socially most relevant eye region. Through retrospective analysis, we will compare typically developing infants to infants who develop autism. We expect that differences in attachment styles of the infants may also modulate their performance and sensitivity.

21. Christian Kliesch, Stefanie Hoehl, Vincent Reid, Anna Theakston and Eugenio Parise

The role of communication in action segmentation

Parents commonly use ostensive signals, such as direct gaze, at event boundaries (Brand, Hollenbeck, & Kominsky, 2013). Segmenting a stream of events is an important part of making sense of actions (Zacks, Tversky, & Iyer, 2001; Baldwin, Baird, Saylor, & Clark, 2001). We investigated whether children use these signals to segment action sequences. Eighteen-month-olds are more likely to imitate an experimenter sliding/hopping an animal across a board when they see the action performed on its own, compared to

sliding/hopping it into a house (Carpenter et al., 2005). It is possible that they interpret the manner as part of the higher order action of putting the animal into the house. If children use ostensive signals to identify action boundaries, addressing them after hopping/sliding might make them see the manner as an action of its own, and increase its imitation. In a between subject design, we addressed infants with direct gaze and “Wow!” after hopping/sliding, but before putting the animal into the house (boundary marked; $n=20$). In a control group this address occurred after the animal was put in the house (boundary unmarked; $n=20$). We built mixed effects models and report Bayes Factors to establish their likelihood (Jarosz & Wiley, 2014; Dienes 2014). A model with boundary marking as main effect was not significantly better than the null ($\chi^2(1)=13.34$, $p=.24$, $BF(1|0)=0.16$). A model exploring the interaction between manner (hopping vs. sliding) and boundary marking showed evidence against the null ($\chi^2(1)=1.36$, $p=.0003$, $BF(2|0)=64.72$) and the main effect model $\chi^2(0) = 11.97$, $p<.0001$, $BF(2|1)=397.42$. Analysing each manner separately shows a significant effect of marking for sliding ($\beta=-0.78$, $SE=0.33$, $p=.02$), but not hopping ($\beta=0.18$, $SE=0.28$, $p=.52$). For salient hopping actions, marking the boundary did not increase high levels of imitation. However, for less salient sliding actions, boundary marking increased imitation, highlighting the complex relationship between salience and communicative signals in action understanding.

22. Trine Sonne, Osman Skjold Kingo and Peter Krøjgaard

Spontaneous memories in 35- and 46-month-old children: How important is the experimenter as a cue at the time of retrieval?

Most people have experienced spontaneously recollecting a memory without a deliberate attempt of doing so. So-called involuntary memories or spontaneous memories have been the target of investigation in adults for years (for an overview see Berntsen, 2009). Anecdotal evidence suggest that young children also have this type of memories. However, until recently this was not examined systematically. A novel experimental paradigm has provided evidence that it is indeed possible to induce this type of memories in young children aged 35- and 46- months (Krøjgaard et al., 2017). In the original experiment the children were presented with an interesting event, and when returning after a week, their spontaneous recall of this event was examined. The results showed that some of the children indeed did produce spontaneous memories. However, we do not know exactly what makes these children spontaneously remember the experienced event. What cues are of importance for later recall? Recently we have examined the importance of

returning to the exact same location finding that this is not of major importance to spontaneous recall (BLINDED). Therefore, in a new study we are investigating the importance of the experimenter. More specifically, we are interested in what exactly it means for the children's ability to spontaneously recall an event, if the experimenter at the final visit is not the same experimenter that introduced them to the to-be-remembered event. Results are currently being collected and coded. Results are expected before Summer 2018.

23. Bethany Wainwright, Melissa Allen and Kate Cain

Facilitating word learning and symbolic understanding in typically developing infants and children with autism spectrum disorder: The role of iconicity

Iconicity is the extent to which an image/symbol resembles its referent. Prior work has shown that more visually iconic images help typically developing (TD) infants and children with autism spectrum disorder (ASD) to understand that pictures are symbols and refer to real world referents. The extent to which an image can be increased in iconicity is restricted in traditional picture books, but a tablet device such as an iPad may open up learning opportunities by manipulating iconicity. This study aims to investigate whether automatic and manual 3D rotation of objects on iPads enhances iconicity and word-picture-referent understanding in children with ASD and early typical development to a greater extent than 2D images. A sample of 48 TD infants and 48 children with ASD will participate in this study. Firstly, in the training stage, participants will view multiple coloured pictures of a novel object, either 2D, 3D automatic rotation or 3D manual rotation. These pictures will be named with an unfamiliar word by the experimenter. Following the training stage, participants will progress to the mapping and generalisation stages to assess symbolic understanding and transfer to real objects. Whether children restrict the novel word to the picture (associative response) or extend it to the picture (symbolic response) will be measured. Results will inform theories of symbolic understanding and word learning in atypical development.

24. Eleanor Smith, Trevor Crawford, Megan Thomas and Vincent Reid

Maternal personality and its influence on facial expression and sensory gating development

Schizotypy is a personality dimension within the general population elevated among schizophrenia-spectrum patients and their first-degree relatives.

Event-related potentials display abnormalities in certain schizophrenic disorders, suggesting difficulties in sensory gating: the pre-attentional habituation of responses distinguishing between important and irrelevant information explored using the paired-click paradigm. The schizophrenia-spectrum, including psychosis vulnerability, demonstrates poor abilities in processing facial emotional expressions with greater sensitivities to negative expressions. If these deficits contribute to the development of schizophrenia by influencing schizophrenic-like characteristics, they may be observable in neuro-typical individuals with schizotypal traits. This research aimed to observe whether 6-month-old offspring of schizotypic mothers displayed abnormalities in a series of paradigms previously highlighted as atypical in the schizophrenia-spectrum. Participants were categorised into two groups: infants of control mothers and those of schizotypic. The paired-click paradigm supported the hypothesis that infants' absolute mean differences and suppression ratios were influenced by their mothers' schizotypy status. Results suggest some impact of maternal personality on the development of sensory gating, with control infants inhibiting repeated stimuli, whereas those at-risk illustrate smaller differences, indicating poorer sensory gating. The well-established correlations between schizotypy and reduced suppression categorised by small difference scores or large suppression ratios are replicated in the current study. The Facial Expression paradigm displayed differential processing between positive and negative expressions, with greater amplitudes in the negative replicating previous literature. No indication that maternal schizotypy influenced the infants' ability to differentiate between the faces was observed. The adult cohort also displayed this differential processing, illustrating diminished attentional mechanisms towards both expressions.

25. Anat Ninio

Modification is absent from three-word long sentences

Syntactic relations come in two kinds: complementation relations such as verb-object and adjunct relations such as adjective-noun modification. Travis, Tomasello's diary subject, had many adjective-noun combinations in her two-word speech but such combinations were almost totally absent from her earliest 102 sentence types of more than 2 words (Ninio, 1994). We hypothesize that this pattern is characteristic of English-speaking children in general. We collected a sample of 410 young English speaking children from the CHILDES archive at the beginning of multiword combinations, mean age 2;2.28 (SD =0;4.19). We searched for their two-word long sentences

expressing the syntactic relation of verb and direct object, and of the relation of prenominal adjective modifying a noun. Then, we searched their 3 initial three-word long sentences for verb-object and adjective-noun combinations. There were many verb-object combinations but almost no adjective-noun combinations in three-word sentences, replicating the findings of the previous study. We computed a chi-square test of independence between the production of any two-word and three-word sentences incorporating the relevant syntactic relation. The results showed that the production of verb-object combination in the early three-word sentences was not independent on their production as two-word sentences by the same child ($\chi^2 = 14.45$, 2 d.f., $p < 0.001$). However, the production of adjective-noun combinations as part of the longer sentences was independent of the same child producing two-word combinations of the same ($\chi^2 = 3.74$, 2 d.f., $p > 0.05$). The results point to a definite difficulty in using the adjunct relation as part of the more complex three-words long sentence in the start of this phase of syntactic development, although children have no difficulty producing the same when it makes for the whole sentence. Syntactic development is not simply the further combination of already acquired patterns. The findings have implications for helping children to overcome problems in syntactic development.

26. Lena Ackermann, Robert Hepach and Nivedita Mani

Individual differences in early word learning: The effects of category curiosity and density

Children show considerable individual differences in their early vocabularies. While these differences might in part be driven by the input, the child herself should also be considered as a source of variability. How can the interaction between category density and category curiosity help explain individual differences? If a child is curious about particular categories (e.g., animals, vehicles), her curiosity might impact her learning of novel members of these categories. Additionally, we hypothesize curiosity to influence the semantic density of categories in the child's vocabulary: Children should know more words in the categories they are more interested in. Here we investigate the influence of category curiosity and category density on the acquisition of new word-object-associations. 30-months-olds ($n=40$) were, first, presented with 16 familiar objects from two broad ($M = 31$ members) and two narrow ($M = 11$ members) categories and heard their corresponding labels while their pupil dilation response was measured as an index of their interest in members of the different categories. Next, they were exposed to novel

members from each of the four categories and tested on their learning of the new word-object-associations. In addition, a vocabulary questionnaire and a questionnaire on the child's interests in different category members were administered. Analyses indicate that children are able to learn novel members from both broad and narrow categories, but learning is more robust in the broad categories. This suggests that children are able to leverage their existing semantic knowledge to learn new words, which is in line with previous research. Ongoing pupil dilation analyses will then examine the extent to which learning and category size is impacted by children's inherent curiosity in objects from a particular category.

27. Silvia Sánchez Calderón and Raquel Fernández Fuertes

The emergence of English and Spanish dative alternation as seen in monolingual child data

English (1) and Spanish (2) dative alternation (DA) has been formally accounted for in different ways. In English, the debate focuses on whether to/for-datives (1a) are the source structure from which double object constructions (DOCs) (1b) derive (Larson 1988), or whether DOCs are the original structure instead (Aoun and Li 1989; Haspelmath 2006). Proposals like that of Snyder and Stromswold (1997) and Snyder (2001) establish a common underlying configuration as complex predicates, although they also argue how to-datives require an additional syntactic requirement DOCs do not.

(1) a. John sends a letter to Mary [to-dative]

b. John sends Mary a letter [DOC]

[Larson 1988: 343-353]

In Spanish, Larson's (1988) view has been adopted and so a/para-datives (2a) are analyzed as the source construction of the Dative-Clitic-Doubled ones (DCLDs) (2b) in which an a-DP doubles a clitic (Cuervo 2007; Demonte 1995).

(2) a. Entregué las llaves al conserje [a-dative]

'I gave the keys to the janitor'

b. Le entregué las llaves al conserje [DCLD]

'I gave the janitor the keys'

[Demonte 1995: 6]

We analyze the emergence and the use of English and Spanish DA structures in child L1 data to shed light on their syntactic status. Data come from 14 longitudinal corpora in CHILDES (MacWhinney 2000) and both the input and the spontaneous production of 13 English (0;06-8;00) and 9 Spanish (0;11-4;08) children are analyzed. Results show that double object and

prepositional DA constructions emerge at a similar age ($p=.067$ in English; $p=.863$ in Spanish), as per Snyder's proposal that DA structures are not derivationally related, and this is possibly so for the two languages. Developmentally, double objects show a higher use than prepositional constructions ($p=.001$ in English; $p=.043$ in Spanish). This difference could be explained by the additional syntactic requirement of prepositional DA structures and by the adult input.

28. Mariia Pronina, Iris Hübscher, Judith Holler and Pilar Prieto

Does enacting mental states and emotions improve children's perspective taking and pragmatic skills? A training study.

Previous training studies have shown the beneficial effect of language games and conversations about internal state terms on children's cognitive development (e.g. Ornaghi et al. 2011; see also Guajardo & Watson, 2002; Lohmann, Tomasello, & Meyer, 2005). However, little is known about whether perceiving and enacting multimodal expressions of internal states and emotions can contribute to enhancing perspective taking skills. The goal of this study is to carry out a between-subjects training experiment with a subsequent comparison of pre-test and post-test scores related to mental state and pragmatic skills. Experimental testing is currently on-going. A total of 90 3-year-old children will be randomly assigned to either the language, the multimodal or the control condition. All participants will be individually assessed on their linguistic and cognitive abilities with a set of measures related to perspective-taking skills (Theory of Mind-, emotion detection-, mental verb comprehension and CASL pragmatic tasks). During a one-month intervention period children in small groups listen to 8 child stories enriched with mental lexicon terms (specifically expressing epistemic and emotional stances) and accompanying images (Ornaghi & Grazzani, 2013). In each session, after listening to the story, children in the language condition are trained through a mini-conversation which focuses on target mental states and encourages children to reflect about the mental states of themselves and others. Children in the multimodal language condition are trained through the mini-conversation but importantly, children were also encouraged to enact the internal states of the story characters. Finally, children in the control group carried out another non-conversational activity related to the story. We hypothesise that even though the language training will have a positive effect on children's ability to take perspective (as in Ornaghi et al. 2011), the enactment training group will obtain higher gains on mental state and pragmatic measures than the other groups.

29. Amy Bidgood, Elizabeth Kirk, Samantha Durrant, Michelle Peter, Julian Pine and Caroline Rowland

Baby Sign, mind-mindedness and language development

Baby sign – a set of gestures symbolising words such as ‘milk’ and ‘tired’ taught to hearing babies – is an increasingly popular activity amongst parents and their pre-verbal infants. Companies promoting baby sign claim it improves language development, decreases frustration and enhances parent-child bonding. However, it is unclear how, and whether, baby sign might achieve these feats. One mechanism by which baby sign could improve language development is through enhancing mother-child interactions: if baby-signing mothers perceive their infants as being capable of intentional communication at an earlier age than non-signing mothers, they might be more likely to acknowledge their child’s deictic gestures (e.g. points, reaches), and respond more often with language, perhaps providing more mental-state terms (e.g. want, like) in response. We investigate (1) whether baby-signing mothers are more likely to respond to deictic gestures (e.g. points, reaches) than non-signing mothers, (2) whether baby-signing mothers are more likely to respond to those gestures using mental state terms (e.g. want, like) than non-signing mothers, and (3) what impact maternal responsiveness and use of mental-state terms have on children’s vocabulary development. At 11 and 12 months, mother-child dyads (N = 46, 23 baby-signers) were filmed interacting for a total of 46 minutes. Interactions were coded for infants’ deictic gestures (e.g. points, reaches; baby signs were not included) and maternal responses to these gestures. Initial analyses on 5-minute samples suggest that baby signing affects neither the rate or content of mothers’ responses to infants’ deictic gestures. However, baby-signing babies produce slightly more deictic gestures than their non-signing peers. Over time, this may give baby-signers more opportunities to hear contingent utterances from which they can learn. To test this, we will present findings from the full 46 minutes of interaction, and relate this to vocabulary development up to 18 months.

Session 2: Thursday, September 6, 2018

1. Gemma Taylor and Sarah Norgate

Young children's emotional development in the digital world

Emotion understanding is an important skill related to children's school readiness (Denham, 2007). The best predictor of child emotional health is the mental health of the child's primary caregiver (Helliwell, Layard & Sachs, 2017). Given that a high proportion of children's social interactions with caregivers are now digitally mediated, it is important to understand whether children can recognise and understand emotional facial expressions presented on digital content and to explore the role of dialogic questioning techniques (Zevenbergen & Whitehurst, 2003) during media use. Seventeen 3 year old children ($M = 43.82$ months, $SD = 7.75$ months) watched videos with ($n = 7$) or without accompanying dialogic questioning from the experimenter ($n = 10$). Eight videos were created with two adults acting out simple vignettes (e.g., one adult receives a gift from the other) followed by a facial expression depicting an emotion (e.g., happiness). Four emotions were used in the videos; happiness, sadness, anger and fear. Children's recognition of emotional facial expressions was assessed using a 4-choice picture pointing task using pictures of the facial expressions shown in the video (Figure 1). Emotion understanding more broadly was tested with The Puppet Interview (Denham, 1986). Overall, there was no difference in children's emotional facial expression recognition between conditions, $t(14.86) = 0.14$, $p = .89$ and performance did not differ from chance in the video, $t(9) = -.064$, $p = .54$ or video with dialogic questioning, $t(6) = -0.51$, $p = .63$ condition. There was also no difference between conditions in children's ability to label, $t(10.40) = 0.04$, $p = .97$ and recognise emotions, $t(12.61) = 0.56$, $p = .59$. We are currently running the study with a storybook version of the videos to determine whether chance performance on the emotional facial expression recognition test was due to the use of digital content.

2. Lana Jago, Michelle Peter, Samantha Durrant, Amy Bidgood, Julian Pine and Caroline Rowland

Investigating Predictors of Individual Differences in Productive Vocabulary and Their Ability to Identify Late Talking Toddlers

Understanding individual differences in language acquisition is fundamental to developing our knowledge of language impairments. Currently, late talking

children are identified on the basis of productive vocabulary, typically, at 24 months (Fernald & Marchman, 2012; Dale, Price, Bishop & Plomin, 2003). We investigate multiple predictors of individual differences in productive vocabulary at 24 months as measured by the Communicative Development Inventory (CDI), in order to better understand the mechanisms involved in early productive vocabulary development. These predictors include earlier measures of receptive and productive vocabulary, phonological working memory, quality of input, speed of linguistic processing, and mean length of utterance. Following this, we investigate the strength of these predictors in identifying a delay in productive vocabulary at 24 months. The first analysis investigates the association between these measures and productive vocabulary scores. A regression analysis examines the strength of these predictors in explaining the variance in productive vocabulary at 24 months. A second analysis investigates the strength of the successful predictors in distinguishing between children with and without a delay in productive vocabulary development. The ROC curve analysis measures overlap in scores obtained by children classified as having a delay in productive vocabulary development and children with typically developing language, providing details on scores with optimal sensitivity and specificity for this classification. The preliminary results from the first analysis show that, in addition to earlier productive vocabulary scores, receptive vocabulary and phonological memory are predictive of variance in 24 month productive vocabulary scores. The final analysis will also include speed of linguistic processing and mean length of utterance as additional predictors of individual differences in productive vocabulary development. The results for the sensitivity and specificity analysis suggest that a number of the predictors successfully identify children with a delay in productive vocabulary development, yielding acceptable levels of sensitivity and specificity.

3. Katrina Martindale, Hope Hodgson-King and Nayeli Gonzalez-Gomez *Exploring Infants' Ability to Understand Emotion Words*

During language development, infants have to learn labels referring to physical things, such as “cat” or “table” (i.e., concrete words), but they also need to learn labels referring to things not having physical or concrete existence, such as “love” or “gone” (i.e., abstract words). Previous research has mainly focused on the age at which infants begin to understand concrete words. Different studies have demonstrated that infants as young as 6months are able to understand some concrete words including body parts, food-related words, and other common nouns (e.g., Tincoff & Jusczyk, 2011;

Bergelson & Swingley, 2012). However, it is not until 10-to-13 months of age that infants have been found to begin understanding some abstract concepts such as “eat” and “all gone” (Bergelson & Swingley 2013). The present study explored the age at which infants begin to understand abstract words for feelings (e.g., happy, sad). Using a Tobii eyetracker TX300, we recorded 9-to-18-month-old infants’ eye movements while they were watching videos showing two faces each displaying one of five different emotions (i.e., happy, sad, scared, angry and surprised) or a neutral face. In each video the two faces were presented side-by-side and started moving synchronously in a vertical way, while an audio said: Look! [target word], s/he is [target word]!. Preliminary results (N=21) analyzing the proportion of target looking revealed that infants as young as 9 months of age were able to understand abstract words referring to emotions. Taken together these results suggest that infants begin to understand some abstract words later than concrete words. This is in line with research showing that concrete words are processed faster than abstract words (Paivio, 2013), given that concrete words are processed by both the verbal and non-verbal systems, while abstract concepts only use the verbal system.

4. Hope Hodgson-King, Katrina Martindale and Nayeli Gonzalez-Gomez
Early walker’ or ‘Early talker’? The effects of Infant Locomotor status on Infant Language acquisition

Were you an ‘early walker’ or an ‘early talker’? The link between infants’ motor development and language acquisition has been subject to investigation for more than four decades. Long-standing speculation and discussions among parents and researchers have led to assumptions that infants cannot develop both language and motor developmental milestones simultaneously. Infants are therefore, commonly characterised as either ‘early walkers’ or ‘early talkers’. However, a recent study found an increase in language acquisition with walking onset as reported by parental questionnaires. Nevertheless, various studies have highlighted the discrepancies existing between parental report vocabulary measures and vocabulary tasks. The present study, therefore, aimed to further examine the influence of locomotor status (crawler vs. walker) on infant language acquisition using both parental questionnaires and preferential looking task measures. Preliminary results of 26 9-to-17 month-olds are reported here. Infant’s vocabulary was measured prior to the test. Infants were tested using a preferential looking paradigm in relation to whether parents had reported words known and unknown. Preliminary results showed a significant positive

relationship between infant vocabulary scores and motor ability; supporting the idea that infant's vocabulary increases when they start walking. However, results also revealed that parents of walkers were more accurate than parents of crawlers. The present study, provides primary evidence not only for the links between infants' language acquisition and motor development but also for the accuracy of parental questionnaires and the effects infant locomotor status has on parental perceptions of infants' language abilities.

5. Florence Oxley, Tamar Keren-Portnoy and Eytan Zweig

Tracing the emergence and development of cerebral lateralisation in babble

Speech and language are supported predominantly by structures in the left hemisphere of the brain in most humans (Graves & Landis, 1990) and the left cerebral hemisphere may be predisposed to recruit speech sound articulation. My study examines whether pre-linguistic infant vocal behaviour is left lateralised, by mapping lateralisation during the period when infants' vocal behaviour becomes increasingly intentional and tuned to language development. Analysing asymmetry in mouth opening is a non-invasive method, which can reveal differential hemispheric involvement in vocalisations and facial expressions. Holowka & Pettito (2002) found that babble (the most language-like behaviour emerging during the first year of life) was left lateralised, while smiles and non-babble vocalisations showed different hemispheric involvement. They interpreted this as indicating that babble is underlyingly linguistic. However, babble is not produced with communicative intent, so is different from language. Additionally, Holowka & Pettito (2002) did not investigate when this left lateralisation emerged or whether it developed with articulatory practice. In a pilot study, I found that lateralisation in babble may increase with the attainment of milestones in speech sound articulation. My research aims to ascertain whether lateralisation increases specifically with linguistically relevant developments, or with more general development. I examine lateralisation during vocal and emotional behaviour in infants, aged 5-12 months, capturing the transition into babble and subsequent increases in the sophistication of its articulation. Preliminary results from five infants' initial data collection sessions (at 0;5.0), prior to babble onset, indicate that smiles were right lateralised in 8 of 10 sessions, while non-babble vocalisations showed more variability, being right lateralised in 5 of 10 sessions and left lateralised in 5 of 10. The data currently under analysis were collected following the emergence of babble and may provide insight into the point of emergence and developmental trajectory of the lateralisation observed during babble.

6. Tiphaine Caudrelier, Lucie Ménard, Jean-Luc Schwartz, Pascal Perrier and Amélie Rochet-Capellan

Transfer gives a glimpse into emerging speech units: a speech production study in 4 year-old children

Phonological units underlying speech production (i.e. interfacing with speech articulation) change through development, possibly in a top-down manner. To produce their first words, infants could rely on word templates (Vihman & Croft, 2007). Then children may build up representations of smaller units, such as syllables and phonemes (Cristia & Hallé, 2012). The auditory-motor learning paradigm allows to study speech production units. This paradigm consists in applying an auditory feedback perturbation while speakers produce a training utterance. Over repetitions, speakers are expected to change their pronunciation in order to compensate for the perturbation. A change persisting after perturbation is removed indicates auditory-motor learning. Transfer to other utterances is claimed to reveal speech units involved both in training and testing utterances (Houde & Jordan, 1998). Thirty-one pre-schoolers (mean age: 4 years 10 months) participated in an auditory-motor learning experiment associated with a phonological awareness test (Lefebvre & Sutton, 2008). We measured transfer from the syllable /pe/ to the real word /epe/ to shed light on both syllables and phonemes' representations in production. Results show little auditory-motor adaptation. However, we observed an effect (or transfer) of the pronunciation of /epe/ on subsequent productions of /pe/ that may support the idea that syllables' representations emerge from produced words.

7. Crina Marina

Emotion recognition deficits in preschoolers with callous-unemotional traits

Callous-unemotional traits have recently received increased attention, especially in relation to socio-emotional development. Current data suggests that high callous-unemotional children are characterized by impairment in their ability to reliably process emotional cues from others. Studies have mainly explored such traits in primary school children or adolescents. However there has been evidence showing that CU traits can already emerge in preschoolers, being predicted by reduced face preference in infancy. Early identification and intervention has the potential of reducing the burden of psychopathology later in life, while facilitating optimal adjustment during preschool years. In order to overcome existing limitations, the proposed design includes novel methodological elements, such as eye tracking

technology. The desired sample consists of preschool children (3-6 years old) both low and high on a measure of CU traits. Parents are asked to complete questionnaires about their child's behavior and temperament, while the child performs a modified version of the Emotion Recognition Task. This version involves the use of an eye tracker to follow the gaze of the child when processing a dynamic depiction of a basic emotion. Preliminary results reflect a significant difference in the accuracy of identifying emotions between the preschoolers low on CU traits vs. those high on CU traits. Furthermore, data generated using the eye tracker may inform about the possible differences in processing facial cues when labeling emotions. Behavioral and temperamental variables are explored as mediators/moderators of the relationship between CU traits and emotion recognition. Theoretically, knowledge about emotion processing at a young age offers a comprehensive notion of how this competence develops. A reflection of its manifestation during the preschool years enriches existing developmental models of psychopathology and can also understructure interventions for prevention and treatment as early as possible.

8. Priya Silverstein, Gert Westermann, Teodora Gliga and Eugenio Parise
Preverbal infants' attention allocation to communicative and non-communicative scenes

Ostensive-referential communication has been claimed to be pivotal for learning in infancy and to have a specific effect on what infants learn (Csibra & Gergely, 2009). Yoon et al. (2008) found that after viewing a communicative scene (ostensive pointing, occluder covering object, occluder revealing a change), 9-month-olds detected identity changes more than location changes. But after viewing a non-communicative scene (non-ostensive reaching, etc.), infants detected object location changes more. Although Yoon et al. did not report any difference in the amount of looking to the communicative or non-communicative scenes, it remains possible that a difference in attention allocation, i.e. where infants were looking during these scenes, explains what information was encoded. To investigate this, we conducted a pre-registered replication of the previous study (n=40) using eye-tracking in addition to hand-coding looking time. We did not replicate the original finding, instead finding that infants detected only identity changes [$t(23) = 2.79$, $P = 0.008$], after viewing both types of scenes. We visualised the time course data from infants' viewing of these scenes. A bootstrapped cluster based permutation analysis showed that, in between the periods where the pointing/reaching action was performed looking towards the face was significantly higher in the

communicative condition. During the first time the action was performed, looking towards the hand was significantly higher in the non-communicative condition. As we did not replicate differential memory biases after viewing communicative and non-communicative scenes, we cannot claim that these attentional differences could be responsible for the original finding. We believe our non-replication may be due to being unable to satisfy the strict inclusion criteria used in the original study, specifying that infants watch the entire occlusion period for every trial. We have reduced the occlusion time to allow us to use this criterion, and data collection is ongoing.

9. Marina Bazhydai, Priya Silverstein, Gert Westermann and Eugenio Parise
Preferential transmission of simple actions over pedagogically demonstrated actions in two-year-old children

Both pedagogical communication (direct eye contact and child-directed speech; Csibra & Gergely, 2009) and intentional but non-pedagogical communication result in learning in children (e.g., Gopnik & Schulz, 2004). However, less is known about transmission of information learnt in these two ways. Vredenburg, Kushnir and Casasola (2015) showed that 2-year-olds are more likely to demonstrate an action to an adult after learning it in a pedagogical than in a non-pedagogical context. Here we asked the question of whether and how pedagogical communication and action complexity interact to affect information transmission. In Exp. 1, 24-month-old children ($N = 31$) interacted with two unfamiliar adults who demonstrated two actions. One demonstrator showed a simpler action in a non-pedagogical manner, while the other showed another, more complex action in a pedagogical manner. Afterwards, children were significantly more likely to demonstrate to a third experimenter the simple action first, even though it was presented without explicit pedagogical cues ($t(30) = -2.68, p < 0.01$), suggesting preferential transmission due to the ease of execution rather than pedagogical demonstration. In Exp. 2 ($N = 31$), we attempted to replicate the results by Vredenburg et al (2015) to test whether pedagogical communication modulates information transmission in absence of other factors. We used the same procedure as in Exp 1, except that action complexity was matched for both pedagogically and non-pedagogically demonstrated actions in each trial. Children were equally likely to perform either the pedagogically or non-pedagogically demonstrated action first, both in simple and complex trials, thus producing a null result ($t(30) = .00, p = 1.0$). We find no evidence for preferential transmission of pedagogically communicated actions, failing to replicate the results found by Vredenburg

et al (2015). However, we do find evidence for preferential transmission of less complex actions, which may be the result of heightened saliency.

10. Ingeborg Roete, Marisa Casillas and Paula Fikkert

Relating maternal speech rate changes to child language proficiency

Caregivers' child-directed speech is often characterized as 'fitted' to the child's linguistic abilities; from the words and syntactic structures caregivers choose to their interactional prompts, child-directed speech changes with the age of the addressed child. An open question is how caregivers' child-directed speech changes in the first year and a half of life, for most of which children are not yet verbally productive. In this study we will investigate the relationship between changes in maternal speech rate and child language proficiency before, during, and after the time when children begin to say their first words. We will look specifically at whether maternal child-directed speech rates (e.g., words/syllables per second) change as children become more proficient language users in the first year and a half of life. Previous corpus studies have shown a shift in maternal speaking rate around the time children use multi-word utterances (Ko, 2012), but this study focused on children who were already verbally productive. For children who are not yet speaking or who are just starting to speak, we make two predictions: (a) maternal child-directed speech rate will, on average, decrease as children get older, and (b) the speech rates of individual caregivers will change with respect to each child's own linguistic development, both with respect to their production and comprehension. To answer these questions we will measure speech rate in a collection of at-home audio recordings collected from 56 Dutch-speaking children and their parents at ages 8, 12, and 16 months (Nijmegen-Dijkstra-corpus; PhD thesis in progress). At each age point, parents also completed the Dutch CDI questionnaire. We have only just begun pursuing this research, so no results can yet be shared, but we aim to bring initial results to discuss with respect to the two research questions outlined above.

11. Kirsty Dunn, Tim Donovan and Vincent Reid

Using Postnatal Methodologies to Index Behavioural and Physiological Response to Social Stimuli in Utero

Many assume that establishing evidence for cognitive or perceptual abilities in young infants provides evidence of innate origin. For example, contagious crying, where a newborn infant cries in response to the sound of another's

cry has been considered a precursor to the development of empathy (Hoffman, 1975). Buhler & Hetzer (1928) first reported 84% of infants between 1- and 14- days old cried when exposed to another crying infant. Simner (1971) reported infants who were exposed to the sound of a newborn cry cried significantly more than those who were presented with either a) silence, b) white noise, c) a computer-generated cry, or d) the cry of an older infant. Innate interpretations such as Hoffman (1975) fail to account for experiences encountered during development prior to birth. Mampe et al. (2009) show that the newborn cry melody is already shaped by the native language indicating the processing and influence of the auditory environment in utero. This opens up an important question as to which aspects of social stimuli the human fetus has the capacity to process and respond to prior to birth. We present data from a close replication of newborn contagious cry studies in a prenatal sample. Using 4D ultrasound, facial expression will be compared in response to a) newborn cry, b) 1-month-old laughter, and c) baseline silence. In addition, attentional allocation will be compared across conditions through the measurement of fetal heart rate (Clifton, 1974; Nelson et al., 1978). Putative results (N = 33, gestation 33-34 weeks GA) show the presence of mouth movements and appropriate facial expressions and variation in heart rate recordings. The response to emotional stimuli before birth will contribute to our understanding of well-documented capacities in neonatal infants earlier in development than has previously been indexed and prior to the acquisition of postnatal experience.

12. Juan Giraldo-Huertas and Graham Schafer

An applied strategy for interventions in children at risk of not reaching their potential in middle-low income countries

More than 40% of children under 5-years-old in middle-low income countries are under risk of not reaching developmental potential for causes associated with poverty and psychosocial deprivation. Additionally, these children, even with specific medical and biological factors maintaining that risk, does not receive early intervention in health systems nor government or community programs. Also, parents could underestimate just how early children can be affected by interaction and experiences, fundamentals for enhancing their children development. A way to improve the life chances of low-income children, families, and communities is described in a model for getting big data information about relevant aspects oriented to reduce impact of adverse conditions in child development in developing countries. First components of this model include a baseline with previous measurement of developmental

outcomes in children of two major geopolitical regions in a middle-low income country, and the use of a tool administered by parents to report different items related to sociocognitive milestones. First analysis within a regression model founded 14 variables significant associated with an Index of Sociocognitive Development of children from 0 to 6 years of age in the geographic regions of interest (Table 1), including if the child is a girl, the educational level of the mother, the quality of gestation and give birth process, also attending a kindergarten was associated with better development results, and to perform physical activity outdoors, as well as the parent's perception and practice of autonomy with their children. Conclusions are extending to how we need more data at national level about daily activities of interaction between parents or caregivers to mitigate the negative consequences of poverty and economic inequality in children.

13. Lizhi Ma, Katherine Towmey and Gert Westermann

How Perceived Emotions Influence Toddlers' Word Learning

Background. Early word learning occurs on a background of rich environmental variability. Research indicates that infants can rapidly map words to objects and retain these mappings across repeated exposures (Carey, 1978; Smith & Yu, 2008). Aspects of the learning environment, for example visual variability, are reported to affect this ability (e.g., Axelsson & Horst, 2014; Twomey, Ma, & Westermann, 2017); importantly, nonetheless, infants also perceive social cues such as the emotional display of speakers when they learn new words (Tomasello, 2001). Evidence indicates that both emotionally positive and negative vocalisations facilitate infants' recognition of words (e.g., Singh, Morgan, & White, 2004). However, how perceived emotions influence infants' longer-term learning of word-object associations remains unknown. **Method** The current study employs eye tracking to explore whether word learning is affected by perceived emotions in 30-month-old children. This two-day study consists of a referent selection (RS) training phase followed by two retention (RT) test phases, the first after a five-minute break and the second on the following day to examine toddlers' long-term retention. During RS, participants see three sets of one novel and two known objects presented on a computer screen and labelled by an experimenter with happy, disgusted, and neutral affect (e.g., happy: "Can you find the coodle? ... WOW! LOOK! There is the coodle!"). During RT, children see three novel objects either labelled with neutral affect or accompanied by emotional cues without labelling the objects (e.g., "WOW! LOOK! ... WOW!"). Target looking time is recorded. Additionally, participants are encouraged to point at

the targets during RT, the point responses are also recorded. Hypotheses Based on research showing that negative emotions (e.g., fear) attract more attention from infants over 7 months old (Hoehl, 2014), we assume better retention for objects labelled in a disgusted manner compared to the neutral and positive ones.

14. Morgane Jourdain and Karen Lahousse

The early acquisition of relative clauses and cleft sentences in French

1. Background and goal. 1.1. Relative clauses and subordinate (pseudo-relative) clause in cleft constructions are syntactically similar, but they serve different discourse functions. Relative clauses are used to identify, further specify or give information about the identity of the antecedent (Comrie, 1981; Lambrecht, 1988). By contrast, cleft constructions are typically used to highlight the new information and their pseudo-relative subordinate clauses typically express discourse-old information (Lambrecht, 1994). 1.2 Studying two constructions which are syntactically similar but pragmatically different will allow us to determine which discourse functions are easier to acquire by children without interference from syntactic complexity. 1.3 Our analysis is based on longitudinal data from the Lyon corpus (Demuth & Tremblay, 2008) from 3 children between age 1;5 and age 3;5. This corpus provides 293 clefts, and 7 relative clauses.

2. Results. 2.1. Clefts appear earlier (age 2) than relative clauses (age 2;5), and are much more frequent. 2.2. We will argue that clefts develop earlier in child language than relative clauses because: (i) Constructions expressing a single proposition, like clefts, are easier to process for children, explaining their earlier emergence. Sentences containing a relative clause typically contain two propositions, but, interestingly, in the first productions of relative clauses we found, the main clause is purely presentational, introduced by *c'est*, resulting in these utterances containing a single proposition. Similar findings have been reported by Diessel and Tomasello (2000) for English early relative clauses. (ii) Our research confirms studies about Germanic languages (Hendriks, 2014), in that since age 2, while children are able to encode discourse-new and discourse-old elements with adult-like syntactic devices (such as clefts), their ability to specify the identity of a referent is restricted at that age, explaining the near-absence of relative clauses.

15. Samantha Russell and Kate Cain

Bunnies in Dresses: How Anthropomorphism Impacts Young Children's Processing of Narrative

Young children's comprehension of oral stories, often presented in illustrated picture books, provides an important foundation for later literacy development (Lynch et al., 2008). Stories aimed at very young children frequently include anthropomorphised animal characters (Marriott, 2002) that dress, behave and converse as if human, whilst simultaneously retaining key physical characteristics of the original creature. However, recent research suggests poorer outcomes in response to these stories; when anthropomorphised animals rather than humans were portrayed alongside an identical narrative, young children showed poorer plot recall and poorer understanding of character reasoning and problem-solving (Kotaman & Balci, 2017). Similarly, in response to identical narratives intended to provoke altruism, children's generosity was elicited only when the story was supported by illustrations depicting humans, rather than anthropomorphised animals (Larsen, Lee, & Ganea, 2017). These findings suggest specific effects of character-type on children's understanding. The aim of the current research is to reproduce and extend Larsen et al.'s (2017) study to explore further the influences of anthropomorphism on comprehension in relation to violations of expectation and perspective taking. In study 1, 3 to 7-year old children will be presented with a moral story, illustrated with either animal or human protagonists. A mini-dictator game will be completed to measure subsequent prosocial behaviour and story recall will be assessed for central and peripheral content (Miller & Keenan, 2009). If children engage less with anthropomorphised stories, lower scores for prosocial behaviour and the coherent recall of essential story elements are anticipated in response to animal protagonists. There are clear potential impacts of such findings; Early Years provision, therapeutic interventions and experimental work exploring young children's cognitive and affective development may need to use stories depicting realistic characters for optimal efficacy.

16. Bálint Forgács, Eugenio Parise, Gergely Csibra, György Gergely, Ildikó Király and Judit Gervain

Preverbal Infants' Theory-Of-Mind on Other People's Linguistic Understanding

Infants seem to possess communicative and linguistic abilities, well before they start to talk, which were largely unpredicted in their level of sophistication. In three electrophysiological experiments using an object naming paradigm in a live puppet theater setting we investigated the very early pragmatic skills of babies, and whether they track the linguistic comprehension of an adult observer seated in front of them. First, we

demonstrated that we can evoke a typical N400 response, a neural marker of detecting a semantic violation, by naming familiar toys either correctly or incorrectly in the presence of another person. In a second experiment, we induced a false belief on behalf of the observer by replacing the object with a second one, without her knowledge, and named it correctly – which was congruent from the perspective of the babies, but incongruent with the falsely held belief of the observer. Babies exhibited a response very similar to a typical N400, when they themselves not, only the observer sitting in front of them heard a semantically incongruous object label. This effect was accompanied by an additional later frontal negativity, perhaps a mechanism to disambiguate the ownership of the N400 effect. In a third experiment, we inverted the situation: we labeled objects always incorrectly from the perspective of infants, but sometimes we did so by using the label for the first, later replaced object. This way the label was congruent with the false belief of the observer, even though it was incongruent with the second object in front of the infant. Preliminary analyses indicated no distinct effects in this study, suggesting that the incorrect labels always evoked an N400 response from the infants, irrespective of the belief state of the observer. Together these results suggest an intriguing interplay between early linguistic and Theory-of-Mind abilities of preverbal infants.

17. Louah Sirri, Szilvia Linnert, Vincent Reid and Eugenio Parise

Infant directed speech enhances face processing

Developmental studies have previously shown that infants are sensitive to communicative cues, such as infant-directed speech (IDS) and eye gaze. Compared to adult-directed speech (ADS), it has high and more variable pitch, limited vocabulary, shorter utterances, and vowel alterations. IDS increases neural brain activity, the allocation of attention to language and fosters social interactions between infants and caregivers (Zangl & Mills, 2007; Naoi et al., 2012; Golinkoff, Can, Soderstrom, & Hirsh-Pasek, 2015). As for eye gaze, infants exhibit enhanced neural activity in response to faces with direct than averted eye gaze (Farroni, Csibra, Simion, & Johnson, 2002). The aim of the present study is to determine whether IDS enhances face processing while maintaining eye gaze constant. Thirty-five infants (age range: 3 months and 21 days to 5 months and 24 days) took part in the study. Infants sat on their caregiver's laps facing a monitor screen and heard the word "hello" pronounced either in IDS or ADS followed by woman's face (NimStim), while their event-related brain potentials (ERPs) were recorded. Two ERP components of interest were analysed: the auditory N600-800 sensitive to IDS

and the visual P100 known to reflect early visual processing. Preliminary results show that the N600-800 was modulated by speech type ($F(1,17)=6.66$, $p=.02$). The mean amplitudes were significantly larger in the IDS (-20.30uV) compared to the ADS (-15.12uV) condition ($t(17)=2.58$, $p=.02$). The visual response to faces was also modulated by the speech type ($F(1,16)=5.14$, $p=.04$) with increased P100 mean amplitude for IDS (14.44uV) compared to ADS (11.36uV) condition ($t(16)=2.27$, $p=.04$). These findings demonstrate that IDS, as communicative cue, enhances face processing. Currently, we are running a control study (inverted faces) to determine whether these effects obtained are specific to faces.

18. Diana Tham, Pei Jun Woo and Gavin Bremner

A cross-cultural comparison between same- and other-race face scanning in infants.

The ability to process faces requires rapid scanning of facial features. Recent studies employing eye-tracking methodologies suggest individuals' scanning pattern is culture dependent (Kelly et al., 2011; Blais et al., 2008). For example, Caucasian children and adults (Western societies) tend to scan the eyes and mouth whereas Asian children and adults (Eastern societies) tend to fixate at the centre of the face. In addition, those that have exposure to both Western and Eastern societies showed a hybrid fixation pattern. Malaysian-Chinese adults living in a multiracial and Western influenced Asian society displayed an intermediate strategy by focusing on the eyes and nose (Tan et al., 2012). The current study aims to investigate same-race (SR) and other-race (OR) face scanning patterns in 9-month-old infants who have exposure to both Western and Eastern societies and those who have exposure to one society. Twenty-two Malaysian-Chinese infants and British-White infants were tested using faces of three racial groups (Chinese, Malay, and Caucasian-White). Scanning patterns around the three major features (eyes, nose, and mouth) were recorded. Analyses of the proportion of looking at the eyes, nose, and mouth indicated a 3-way interaction between culture, face race, and features ($p < .001$). Malaysian-Chinese infants showed more scanning towards the eyes and nose than the mouth area ($p < .028$) whereas British-White infants showed more scanning around the eyes relative to the nose and mouth area ($p < .005$). Further analyses showed differences in scanning between face race for certain features within the British-White culture only ($p < .001$). Overall, the study suggests that infants' scanning pattern is culture dependent and that those who are exposed to both

Western and Eastern societies adopt a broader scanning pattern for SR and OR faces than those who are exposed to only one society.

19. Giorgia Bussu, Alberto Llera Arenas, Emily Jones, Mark Johnson, Christian Beckmann and Jan Buitelaar

Intrinsic patterns in longitudinal measures of behaviour and neural sensitivity to faces at 8 months are related to ASD clinical outcome at 36 months

It is not clear yet how different functional domains interplay in early development leading to Autism Spectrum Disorder (ASD). Although valuable to identify potential early risk markers for ASD, supervised group comparisons based on predefined clinical labels do not consider the heterogeneity of ASD. Here, we investigated the relationships between intrinsic patterns of multi-modal developmental data and clinical outcome at 36 months by means of multi-modal unsupervised learning techniques. Data included longitudinal measures of developmental level, adaptive functioning, and early ASD symptoms between 8 and 36 months, and measures of neural sensitivity to eye-gaze at 8 months in infants at high-risk (HR) and low-risk (LR) for ASD. We used linked independent component analysis (ICA) to integrate data across different domains and time points. Among HR siblings, clinical outcome was established at 36 months (typical development, atypical development, ASD). Increasing cognitive and adaptive functioning and low levels of symptoms between 8 and 36 months could significantly differentiate groups of HR siblings with typical development and LR controls from HR siblings with atypical development or ASD. At 8 months, high average competence and low levels of symptoms were linked to less efficient perceptual processing but increased engagement with gaze shifts and reduced engagement with non-social stimuli. Group differences were significant between HR siblings developing ASD and LR controls. Linked ICA allowed us to show the link between multiple measures across early development, supporting the idea that early signs of ASD must be interpreted as part of larger patterns of developmental variation linked across domains and across age. Our results may indicate important developmental mechanisms underlying typical development as opposed to ASD. Furthermore, our data-driven approach proved to be particularly advantageous for detection of intrinsic patterns in multi-modal data and future work might employ these patterns for unsupervised stratification of ASD heterogeneity.

20. Marina Loucaides, Katherine E. Twomey and Gert Westermann

How do mothers respond to familiar and novel objects during playing events with their child?

Infants' curiosity guides their exploration and learning about their surroundings. Fruitful opportunities for learning and exploration occur during infants' play with their parents and other social partners. In these situations, adults partially shape the environment available to the child. Here we explore how adult social partners communicate with prelinguistic infants and infants at the beginning of language learning. The current study included 9-month-old ($N = 16$) and 18-month-old ($N = 16$) infants. The mothers were presented with eight numbered identical closed boxes, each of which contained one object. The eight objects were three familiar and five novel objects. Order of objects was counterbalanced between participants. The mother and infant were alone in the room. Mothers were instructed to open each box in turn, retrieve the object inside and use the object to play with their infant for 40 s. Transition to the next box was indicated by a sound. The scene was filmed and the speech of the mother was audio recorded. Mothers completed a vocabulary inventory (UK-CDI). We predict that mothers will show different behaviours towards familiar and novel objects and as a consequence this will affect their interaction with their child. It is assumed that mothers will show different behaviours between age groups. We expect that mothers will be more demonstrating and talkative for familiar objects compared to novel. The novelty of the objects is expected to affect the pitch level of the mothers' voice when the novel object is revealed by opening the box. This research will give us important insights about how social partners, and here mothers, interact with their children when they play with objects.

21. Shirley Cheung, Eugenio Parise, Silke Brandt and Gert Westermann

Can bilingualism facilitate flexibility in speech perception?: Evidence from a cross-linguistic fNIRS brain-imaging investigation

Language experience shapes speech perception. One of the most notable perceptual milestones is the onset of perceptual narrowing. This phenomenon involves the perceptual enhancement of native-language properties and the decline in sensitivity to non-native information. Whereas studies suggest that perceptual narrowing in monolingual infants occurs just before 12 months of age (Kuhl et al., 2008; Werker & Tees, 1984), the effect in bilingual infants is less clear. Previous studies have shown that learning two languages enhances linguistic and executive control skills (Bialystok & Barac,

2012). Thus, bilingualism may facilitate perceptual plasticity in infants due to the management of information from two overlapping systems instead of one. If this is the case, then the onset of perceptual narrowing may be prolonged, known as the Perceptual Wedge Hypothesis. One method to measure this hypothesis is to test bilinguals' sensitivity to a non-native phonemic contrast. The current study examined phonemic perception in 10-12-month-old English monolingual infants from the U.K. and Mandarin-English bilingual infants from Singapore. English, Mandarin, and Hindi minimal word-pair contrasts were used in a block-design paradigm. Non-invasive fNIRS brain-imaging was used to measure cortical activity over the bilateral temporal areas, extending to the inferior prefrontal and inferior parietal regions. Data analyses were conducted on HbO values. Our results support the Perceptual Wedge Hypothesis; bilinguals retained their sensitivity to a non-native phonemic contrast at 10-12 months. Interestingly, bilingual infants elicited significantly higher activations to the non-native Hindi dental/retroflex contrast than monolinguals with responses localized in the right hemisphere, suggesting an initial processing of novel information, which can possibly later shift towards the left hemisphere with adequate linguistic experience in Hindi. These findings extend on existing behavioral research on bilingual non-native phonemic perception (Singh, Loh, & Xiao, 2017), providing a novel insight into the neural underpinnings of infant bilingual speech perception.

22. Melanie S. Schreiner, Nicole Altvater-Mackensen and Nivedita Mani

Familiar words aid infants' word segmentation

Infants as early as 7.5 months of age can segment words from a fluent speech (Jusczyk & Aslin, 1995) and store these word-form representations in long-term memory (Jusczyk & Hohne, 1997). Furthermore, familiarization with a word-form helps infants segment similar sounding words from speech streams (Altvater-Mackensen & Mani, 2013). In the current study, we examine whether infants' prior familiarity with words helps infants segment similar-sounding words from fluent speech. 7-month-old monolingual infants (n=28) heard sentences containing either pseudo-words that resembled words already familiar to the infant, hereafter related words, or novel pseudo-words that did not overlap phonologically with any words known to the infant, hereafter unrelated words. Accumulating 100s of listening time to the sentences, infants were presented with repeated isolated tokens of the related, or unrelated words. Infants listened significantly longer to unrelated words relative to related words, $t(27)=-2.56$, $p=.016$, $d=-0.34$, suggesting

successful segmentation of related words. We tested infants' comprehension of the two familiar words by presenting them with images depicting the words and directing them to look at the targets. To examine whether infants accepted the related word as an appropriate pronunciation of the familiar word, we also presented infants with trials where they saw the two images and heard the related pseudo-words. Infants showed comprehension of the familiar words but did not accept related words as appropriate pronunciations of familiar words. The results suggest that infants are able to use their familiarity with words learned in their natural environment to segment similar-sounding words from speech. Thus, word-form familiarity-based segmentation is a powerful mechanism that can drive infants' rapid vocabulary growth. Furthermore, 7-month-old infants already comprehend simple frequent words and distinguish them from subtle mispronunciations of these words.

23. Mutluhan Ersoy, Dr. Emily Jones, Prof. Mark Johnson and Prof. Tony Charman

Developmental Trajectories of Anxiety Problems among Children at Risk for ASD: Cross-Lagged Investigations

Background: Anxiety problems highly co-occur among children with Autism Spectrum Disorder (ASD). However, the constructs that lead to heightened levels of anxiety in ASD are poorly understood. Evidence suggests that temperamental fearfulness/shyness and sadness and effortful control in infancy plays a substantial role in childhood anxiety. The aim of this study is to explore temperamental underpinnings of anxiety in a longitudinal cross-lagged model in a sample of infants at familial high-risk for ASD. In the first model, we investigated the stability of fearfulness/shyness without any cross-lagged effect and the effect of these subscales on anxiety scores. In the second model, we investigated the interaction between fearfulness/shyness and effortful control over time and their association with 36-month anxiety scores. In the third model, we used fearfulness/shyness and sadness subscales to investigate the specificity of the second model. Methods: The sample includes 116 high-risk (due to having older sibling(s) with ASD) and 27 low-risk (due to having no family members with ASD) children. Temperament was measured using the Infant Behaviour Questionnaire at 9 and 15 months and the Early Childhood Behaviour Questionnaire at 24 months. Anxiety problems were measured with the Child Behaviour Checklist at 36 months. Results: The first model showed that fearfulness/shyness was stable over time and 24-month shyness predicted, anxiety problems. The second model

indicated that whilst more shyness at 24 months associated with more anxiety problems, this is reduced by having more effortful control at infancy. The third model showed that predictive relations with later anxiety were specific to fear and not shared with sadness. Conclusions: Both poor effortful control in infancy, and more shyness at 24-month predict heightened anxiety problems at 36-months. This result suggest that effortful control and shyness could be an intervention target for early emerging anxiety problems among children at familial risk for ASD.

24. Silke Fischer, Iris Nomikou, Lilli Kindsvater and Katharina J. Rohlfing

Capturing infants' early communication abilities between 8 and 10 months - the German "Baby-Komm"

Human infants grow up in a social environment: From birth and in interaction with their caregivers, they continuously learn conventionalized forms of communication. While a large body of research focuses on children's early use of words or gestures, more previous studies on infants' understanding of words or gestures strongly suggest a rather gradual growth of communicational abilities that emerge from early experiences in multimodal interactions. Against this background, we have developed "Baby-Komm" (Fischer, Nomikou, Grimminger & Rohlfing, 2018)-a parental questionnaire that aims at assessing infants' early nonverbal communication abilities in German. An essential part of the instrument consists of evaluating the infants' behavior in everyday situations in terms of "situatedness" (Rohlfing, Rehm & Goecke, 2003). In this respect, with the "Baby-Komm", we aim at capturing established collaborative activities and routines that provide a first entry into communicative abilities. More specifically, everyday situations (e.g., saying good-bye) are described to ask parents for the collaborative behavior of their child. This behavior is then analyzed: Along the dimension of responsive versus initiative, the instrument attempts to assess the child's ability to initiate activities. With a further dimension of conventionalized and non-conventionalized, communicative means are assessed that infants apply to do things in a way typical in their culture (Tomasello et al., 2005). In comparison of two age groups (8 and 10 months), first data of parents' reports are reported and analyzed with regard to their conventionalized content on the one hand and initiative and responsive ways of communication on the other hand. The latter distinction is already known as relevant for language development, and is applied for, e.g., operationalizations of joint attention (Mundy et al., 2007). The preliminary results shed a first light on infants' ways

of communication at this very young age and illuminate their development by primary cross-sectional data.

25. Kin Chung Jacky Chan and Padraic Monaghan

Young Children's Use of Mutual Exclusivity and Acceptance of Lexical Overlap in a Bilingual Context

Mutual exclusivity (ME) is a word learning strategy that guides young children to establish one-to-one word-referent pairings. However, bilingual children have to accept lexical overlap (LO), forming two-to-one word-referent pairings. Previous research has shown that bilingual children use ME to a lesser extent and are more likely to accept LO than monolingual children. However, all such studies either did not directly test children's acceptance of LO, or LO tasks only involved one language. In addressing these limitations, the present study investigated whether monolingual ($n = 20$, $Mage = 4.01$) and bilingual preschoolers ($n = 20$, $Mage = 3.92$) would apply ME or accept LO differently in a one-language and a two-language context using a touchscreen computer. Children were first taught the name(s) - one in the ME task and two in the LO task - of one of two novel objects. Then, the children were asked to choose the referent of another novel word in the ME task and that of the just-learned novel words in the LO task. Children's memory of the word-referent pairings was also tested after a 10-minute delay. Interestingly, the two language groups did not perform differently. Results of the immediate test reveal that the children performed better in the ME than LO task and were more likely to accept LO in the two-language condition. In the delayed test, performance was better with words introduced in the two-language condition. In addition, older children tended to remember better words that were ostensibly taught rather than those that required the application of ME. These results suggest that preschoolers are sensitive to the linguistic environment around them and can adapt their word learning strategies to cope with the demands of different learning situations. Also, preschoolers learn words more effectively if word-referent pairings are taught in an ostensive manner.

26. Joan Birules, Laura Bosch and Ferran Pons

Face-language matching skills in monolingual and bilingual 4-month-old infants

Six-month-old monolingual infants can match languages with faces, showing a preference for a silent face that had previously spoken in their native

language. On the other hand, language discrimination skills for phonologically close languages are already present by 4 months of age, both in monolingual and bilingual infants. It remains to be explored whether the language-face association can be observed at an earlier age, and, if so, whether bilingual exposure will affect the emergence of this association. A sample of N=19 four-month-old infants (10 monolinguals; 9 Spanish-Catalan bilinguals) were tested on a language-face matching task. Infants were first familiarized with two female faces alternately presented on a computer screen, one speaking Catalan and the other Spanish. After familiarization infants were presented with two types of test trials: a still picture of both speakers, side by side (silent-trial), and the same picture but with the voice of one speaker, first Spanish and then Catalan or vice-versa (voice-trials). Results from the silent trial revealed that monolingual infants preferred to look at their native-language speaking face. Interestingly, bilingual infants also showed a face preference, related to the dominant language in their environment. Results from the voice-trials indicated that monolingual infants successfully matched the face with the language but only when the face had spoken in their native language. Bilingual infants did not show any preference for either of the faces in the two voice-trials. The current findings indicate that monolingual and bilingual 4-month-old infants can already succeed at establishing a face-language pairing, strongly driven by familiarity with the language (native-language condition). For bilinguals this association seems to be weaker, as seen in the voice-trials. Further research is needed to clarify the developmental process in face-language matching skills and to identify factors behind the differences between monolingual and bilingual infants.

27. Franziska Krause and Katharina J. Rohlfing

Learning to take the communicative role – a training study with a focus on shyness

Background: Taking the correct communicative role in dialog is a socio-communicative competence that is still developing during the second year of life. For example, toddlers show characteristic failures of role reversal by referring to themselves with you. Although modelling roles on an action level that seems to be more transparent than using language, failures persist at 18 months. Recent research indicates that learning through observation could facilitate toddlers' understanding to take their communicative role. In this regard, focusing on shy toddlers that exhibit a stronger tendency of observing instead of interacting could be promising. Aim: With our study, we investigate the influence of an observational training on the ability to take the

communicative role correctly in young children. Further, we hypothesize that shy toddlers would benefit more from an observational training. Method: Following a between-subjects design, participants (mean age: 19 months) were either trained in an observational setting including two trainers interacting with each other (triadic, $N = 20$) or in a one-to-one setting in which the trainer directly addressed the child (dyadic, $N = 20$). Both were comparable imitation tasks that aimed to enhance the ability to take the communicative role correctly which served as the dependent variable. Training was repeated after seven days (t_1 vs. t_2). Shyness was measured by a parental questionnaire. Level of shyness was evenly distributed across settings. Results: During t_1 , neither type of training nor level of shyness affected the dependent variable. However, in t_2 , there was a significant main effect of training in favour of the triadic setting ($p = .05$). Level of shyness was positively associated with correct role-taking ($p = .09$). This marginal effect was stable across training conditions. These results suggest that 19-month-olds can take their communicative role after a triadic training whereas shy toddlers learn equally from both settings.

28. Osnat Segal, Nitsan Kliger and Liat Kishon-Rabin

Infants' preference for speech over time-reversed speech in 'on- and off-channel' noise

The purpose of the present study was to examine the development of auditory selective attention to speech in noise by examining the ability of infants to recognize (prefer) child-directed speech (CDS) over time-reversed speech (TRS) presented in 'on-channel' and 'off-channel' noise. Sixteen typically developing infants were tested twice at 7 months and 12 months of age using the central fixation procedure with CDS and TRS in two types of noise at +10 dB signal-to-noise ratio. One type of noise was an 'on-channel' masker consisting of a noise band centered at 1KHz, and the second was an 'off-channel' masker (distractor) consisting of a noise band centered at 8 KHz. In order for the latter noise not to overlap spectrally with the speech signal, the samples of CDS and the TRS were low-pass filtered at a cutoff frequency of 6KHz, 850 dB/Oct. Three-way ANOVA with repeated measures, with type of stimuli (CDS/TRS), type of masking (Energetic/Distractor), and age were performed. The results show main effect for type of stimuli, no main effect for age and no interaction between age and type of stimuli. Thus, in both ages infants showed preference for CDS over TRS. However, an interaction was found between age and type of masking. Pairwise comparisons confirmed that older infants showed longer looking times for speech stimuli (both CDS

and TRS) with an off-channel masker compared to with an on-channel masker. The findings suggest that infants as young as 7 months of age were able to attend to speech in noise. However, at 12 months of age the 'off-channel' condition was found more attractive for the infants, supporting the notion that infants' ability to suppress off-channel noise increases with age. We take this to indicate improved selective attention in infants at one year of age relative to younger infants.

29. Anina Ritterband-Rosenbaum, Mark Schram Christensen, Mikkel Damgaard Justiniano, Kristian Møller Moltke Martiny and Jens Bo Nielsen

Sense of agency is the key for successful early intervention in infants with congenital brain lesion

Living with a congenital brain lesion may have detrimental effects on the ability to do everyday activities, but contrary to acquired brain lesions, persons and in particular children with congenital brain lesions may have limited or no experience of how their bodies could work. This absence of experience gives rise to challenges for habilitation of sensorimotor abilities and derived cognitive abilities. How can motor and cognitive abilities be achieved and trained in an individual with absent experience about what they may be able to do? In this article, we aim to review the existing knowledge about development of the sensorimotor system and how it serves as a foundation for later cognitive development for infants prior to one year of age. To understand how sensorimotor integration and cognition are linked, we focus on the ability to experience that one is in control of one's actions and their consequences, this phenomenon is known as the sense of agency. We use sense of agency to describe the elements that are involved in establishment of experience about one's own actions and their consequences in the environment. Furthermore, we try to use these elements in a possible strategy to make interventions as early as possible, with the purpose of improving sensorimotor and cognitive abilities as early as possible (before one year of age) in infants with congenital brain lesions.

Notes

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