6TH LANCASTER INTERNATIONAL CONFERENCE ON INFANT AND EARLY CHILD DEVELOPMENT

ORGANISATION

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We are thankful to the staff and students who have dedicated their time and effort to help organise the conference and to the sponsors who made it possible!

WELCOME!

Dear LCICD2021 Attendees,

This year's LCICD has had to join numerous other conferences in going virtual. While we all cannot wait to go back to meeting in person, we are still excited about meeting you all and getting to learn about the fantastic work that will be presented here at LCICD. An upside to this online nature is that we have received more submissions than ever from around the globe. From Uruguay to Australia, over 100 pieces of work from 21 countries will be presented as talks and posters. At the same time, we are trying to live up to being the friendly conference LCICD is known to be. Thus, let us shortly walk you through the organisation of the conference:

The conference is mainly held over Microsoft Teams. The Organising Committee chose Microsoft Teams as the main platform because it can accommodate live presentations and asynchronous communications together in one place. We hope that this will closely resemble our in-person conference and create ample opportunities for attendees and presenters to mingle and chat to each other. Although we have tried to accommodate the various time zones, we ask your consideration if the schedule might not perfectly align with your normal work day. We will record the sessions and make them accessible on Teams as soon as possible, as long as the presenter has given consent. Throughout the conference, the Teams space will provide the opportunity to view the work and sessions, to comment questions and ideas and to directly send chat messages to other presenters and attendees – be sure to make use of these asynchronous options.

The paper talks and keynote sessions will be held on Teams Meetings. This means that everyone can turn on their camera and join the discussions. However, please make sure to turn off your microphone when joining, and keep it off unless you have "raised your hand" and are invited to unmute yourself to ask your question. In the following schedule, each of the red and underlines headings is a joining link to that live session - please do not join the links earlier than five minutes before the sessions begin. More tips and pointers are available in the LCICD General Team, in the Support & Guidance channel. Note, that you do not have to have a Teams account to participate in any of the live sessions. However, we do hope you would join us in the communal space (Gmail & hotmail normally work fine; let us know if we should update your email; then join as a Lancaster University's guest – this is also important for those with Teams

accounts from other universities! You should be able to switch university spaces by going to your account. If the loading screen persists, close Teams and reopen, that should do the trick).

Our poster sessions will be held live on Gather, which can simulate a near real-life poster session experience. There are two poster sessions, one each on the first two days of the conference. We include in this conference programme maps of the poster rooms to help you find your way to the posters that you are interested in. The password will be shared separately. Each poster is connected to a Teams channel for asynchronous communication. This way you can still chat with the presenter if, unfortunately, you cannot make the live sessions. Many presenters also provided a short, supplementary video which can be found by following the links to said channels below the abstracts (once you have joined the Teams).

Lastly, we have made an effort to create social events for some fun and light interactions. At the end of day 1, we will meet on Gather for some chit chat, feedback, and getting to know each other. On day 2 we will be organising some fun games and activities, featuring PowerPoint Karaoke. Some courageous volunteers are needed, and we strongly encourage you to sign up by messaging the chairs at any time. On day 3, we will close the conference by presenting the awards for best poster and best talk, so make sure to stick around! We also care about your well-being, so prior to the keynote presentations, we will offer short desk-stretch sessions to refresh your body and mind.

Bear in mind that LCICD is a safe and comfortable environment for early career researchers to connect with senior researchers and share their work. Please be considerate and kind in your comments and questions, and do make sure to engage throughout the conference so this can be a valuable experience for everyone.

With all this mentioned, let's have a great conference!

Elena & Didar

SCHEDULE DAY 1 (Wednesday, 25th August 2021)

09.00 am   Welcome
09.15 am   Session 1: Cognitive Development   *Moderator: Chiara Capparini*

> **Twelve-, ten-, and six-month-olds remember complex dynamic events across two weeks**
> *Presenting author: Trine Sonne*

> **The neural correlates of inhibitory control in 10-month-old infants: a functional near-infrared spectroscopy study**
> *Presenting author: Abigail Fiske*

> **Development of language-mediated selective attention in toddlers**
> *Presenting author: Jelena Sučević*

10.45 am   15min Coffee Break
11.00 am   Session 2: Language Acquisition   *Moderator: Rachael Cheung*

> **Language-specific label-referent mapping and disambiguation in 4-month-old infants**
> *Presenting author: Amanda Saksida*

> **Prelexical infants' abilities to represent regularities in speech: a near-infrared spectroscopy study**
> *Presenting author: Irene de la Cruz-Pavía*

> **Three-year-olds' comprehension of contrastive and descriptive adjectives: Evidence for contrastive inference.**
> *Presenting author: Jamie Lingwood*

12.30 pm   1h Lunch Break
01.15 pm   Desk-Stretching
> Take a 5-minute pause for some light-hearted desk-based stretching, led by Dina, our resident yoga teacher!
01.30 pm   Keynote 1: Gaia Scerif
> **Attentive learning over early childhood: Understanding developmental mechanisms**
> *Moderator: Charlie Lewis*

02.30 pm   15min Coffee Break and move to Gather

02.45 pm   Poster Session 1 on Gather

04.15 pm   Meet & Mingle on Gather

SCHEDULE DAY 2 (Thursday, 26th August 2021)

09.00 am   Session 3: Speech Processing *Moderator: Kin Chung Jacky Chan*

Development of Cortical Specialisation for Visual and Audio-visual Speech Processing in infancy
Presenting author: Aleksandra Dopierała

The trajectory of speech perception development: Investigating event-related potential Mismatch Responses to different speech and non-speech features in infants of 2, 6 and 10 months
Presenting author: Annika Werwach

Under-resourced or overloaded? Rethinking working memory deficits in developmental language disorder
Presenting author: Sam Jones

10.30 am   30min Coffee Break and move to Gather

11.00 am   Poster Session 2 on Gather

12.30 pm   1h Lunch Break

01.15 pm   Desk-Stretching

Too much information processing already? Take a 5-minute practice to relieve the stress in the mind and body, led by Lancaster based yoga teacher Yun-Chung

01.30 pm   Keynote 2: Natasha Kirkham

Development occurs in the middle of things: Noise, distraction, and attention in infant development
Moderator: Gert Westermann

02.30 pm   15min Coffee Break

02.45 pm   Session 4: Adult-Child Interactions *Moderator: Xiaoyun Chen*

Teachers Matter: The Effect of Teacher Behaviours on Executive Function Development of Toddlers
Presenting author: Sümeyye Koskulu

How Verbs are Represented in Caregiver-infant Interactions
Presenting author: Hanwen Vivian Zhang

03.45 pm   1h Afternoon Tea Break

04.45 pm   Social Events (PowerPoint Karaoke and more!)

The joining link and further details will be shared during the day – keep a look out on Teams!
Note: Quick witted volunteers with a talent for improv will be needed for PowerPoint Karaoke! Get in touch!

SCHEDULE DAY 3 (Friday, 27th August 2021)

09.00 am   Session 5: Vocabulary Development *Moderator: Kin Chung Jacky Chan*

Tablet assessment of word comprehension reveals coarse word representations in 18–20-month-old toddlers
Presenting author: Audun Rosslund

A study of linguistic distance and infant vocabulary trajectories using bilingual CDIs of English and one additional language
Presenting author: Serene Siow

See it, say it? How receptive and expressive vocabulary predict picture comprehension over time in typically developing and late talking children
Presenting author: Rachael W. Cheung

10.30 am   30min Coffee Break

11.00 am   Session 6: Rhythmic Processing *Moderator: Katharina Kaduk*

On the role of infants' multimodal rhythmic movements in triadic interactions with their caregivers
Presenting author: Ana Moreno-Núñez

The temporal structures of mother and infant vocalizations are bursty and converge during natural activity at home
Presenting author: Catalina Suarez-Rivera

Cortical tracking of simple rhythmic stimuli across the first year of life
Presenting author: Aine Ni Choisdealbha

12.30 pm   1h Lunch Break

01.30 pm   Keynote 3: Stefanie Höhl

Getting attuned: Neural synchrony in caregiver-child interactions
Moderator: Marina Bazhydai

02.45 pm   Best poster & talk awards + Goodbye

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KEYNOTE SPEAKERS

Attentive learning over early childhood: Understanding developmental mechanisms

Gaia Scerif
University of Oxford

Across the lifespan, attentional control is thought to play a crucial role in biasing incoming information in favour of what is relevant to further processing. What is its role in gating learning over early childhood? My seminar will focus on complementary methods tackling the tight relationship between attentional control and early classroom learning. In a first line of work, individual differences in executive skills including inhibitory control, maintenance in working memory and selection of task relevant dimensions relate to emerging learning outcomes, in particular early numeracy and literacy. A second line of work uses experiments that manipulate attention, memory and learning in both young children and adults, to explore mechanisms underpinning these longitudinal correlations. Finally, I review data on attentive learning under diverse socio-economic conditions to show that overall attentional strengths and their associations with learning outcomes are highly sensitive to socio-economic context. As a whole, this work points to attentional skills gating early learning, but in ways that are dependent on multiple environmental factors.

Development occurs in the middle of things: Noise, distraction, and attention in infant development

Natasha Kirkham
Birkbeck, University of London

Development occurs in the real world - in noisy, distracting, and occasionally chaotic environments. Within these environments, the infant's biggest challenge is to separate the signal from the noise, to understand what is a relevant cue, and to learn what is a distraction. Prior research has shown that infants do well in situations where attention orienting is supported by redundant multisensory cues (Bahrick & Lickliter, 2000; Lewkowicz, 2000; Richardson & Kirkham, 2004; Wu & Kirkham, 2010). But, what these studies have failed to show is how this works outside of the lab, in real-world contexts, where attention-grabbing cues are not time-locked or controlled. The majority of research to date has been non-ecological, not engaging with the richness of the environment. And in fact, a series of studies from our lab, investigating the effects of multisensory cues on learning has shown that in less controlled situations, the answer is far from simple, with task performances shifting with age, cue modality, learning goals, and individual differences (Broadbent et al., 208; 2019; Kirkham et al., 2019). In this talk, I will discuss research that shows that real-world environments are closely linked to attentional deployment and examine these findings and position them within the broader literature of attentional development, placing emphasis on the interaction between attention and environment, and discussing the role of individual differences.

Getting attuned: Neural synchrony in caregiver-child interactions

Stefanie Höhl

University of Vienna

Caregiver-child interactions are characterized by interpersonal rhythms at different timescales, from nursery rhymes and interactive games to daily routines. These rhythms make the social environment more predictable for young children and enable interpersonal biobehavioral synchrony with their caregivers. By using simultaneous measures of neural and physiological activities from caregiver and child during live interactions, e.g. dual-ECG and dual-fNIRS, we can deepen our understanding of early interactional dynamics and their rhythmicity. I will present our recent research identifying factors critical to the establishment of caregiver-child synchrony, such as affective touch in infants and mutual reciprocity and verbal turn-taking in preschool-aged children. I will further discuss some of the potential functions of interpersonal neural synchrony in early social-cognitive development, from social learning and communication to effective cooperation and interpersonal coordination.

PAPER TALK ABSTRACTS

Session 1: Cognitive Development

 (Click here to join the live meeting)

Twelve-, ten-, and six-month-olds remember complex dynamic events across two weeks

Trine Sonne[1], Osman Kingo[1] and Peter Krøjgaard[1]
[1]CON AMORE, Aarhus University

The Visual Paired-Comparison (VPC) paradigm is widely acknowledged for assessing recognition memory in infancy (e.g., Hayne, 2004). Although the VPC task has been used extensively over the years to test infants' ability to remember simple, static material (e.g., pictures), we know surprisingly little about how infants perform when testing their memory for dynamic events (i.e., events unfolding in time) in the first year of life. While there is evidence to suggest that complex dynamic events (i.e., events involving agents, and a storyline) may be comprehended in the first year of life, 16- to 18-month-olds are hitherto the youngest infants documented to remembering such material (e.g. Sonne, Kingo, & Krøjgaard, 2018). In the current study, using the VPC paradigm, we examined 12-, 10-, and 6-month-olds' (N = 108) ability to encode and remember cartoons involving complex dynamic events across two weeks. Infants encoded one of two short (30 seconds) cartoons. Two weeks later, infants were eye-tracked while watching both movies simultaneously. Results showed that all age groups were capable of remembering these cartoons - evidenced by a visual preference for the encoded movie above chance (ps < .05, rs range .33 - .67). To our knowledge, this is the first experiment to document memory for such complex material in young infants using the VPC paradigm. These results are currently being followed up by a control experiment investigating if it is the storyline per se rather than lower level perceptual information that drives the memory response in these age groups. Such privileged status of the storyline has previously been found in 18-month-olds using the same stimulus material (Sonne, Kingo, & Krøjgaard, 2018).

The neural correlates of inhibitory control in 10-month-old infants: a functional near-infrared spectroscopy study

Abigail Fiske[1], Carina de Klerk[2], Katie Y. K. Lui[3], Liam Collins-Jones[4], Alexandra Hendry[1], Isobel Greenhalgh[5], Anna Hall[1], Gaia Scerif[1], Henrik Dvergsdal and Karla Holmboe[1]

[1]University of Oxford, [2]University of Essex, [3]University of Bath, [4]University College London, [5]Child and Adolescent Mental Health Services, [5]Oxford Health NHS Foundation Trust, [6]Nord University

Infancy and early childhood mark a fundamental period for the development of executive functions; core cognitive skills that support the control of behaviour and attention to meet adaptive goals. Already in infancy, inhibitory control skills support the inhibition of a non-adaptive or goal-irrelevant response. At the same time, important maturational processes occur across fronto-parietal networks associated with these executive skills. However, a lack of age-appropriate tasks and neuroimaging methodologies have meant that studies investigating the functional neural correlates of inhibitory control as it emerges in infancy are rare. With the relatively recent addition of functional near-infrared spectroscopy (fNIRS) into the developmental researcher's toolkit, it is now feasible to non-invasively measure functional activation in the awake infant brain. In this study, we aimed to uncover the neural underpinnings of inhibitory control in 10-month-old infants (N = 135) by employing fNIRS alongside a novel, age-appropriate inhibitory control task. We found that when inhibition is required, the right prefrontal and parietal cortices were significantly more activated than when there is no inhibitory demand. Further, activation in right prefrontal areas was significantly associated with individual differences in response inhibition performance. This demonstrates that inhibitory control in infants as young as 10 months of age is supported by similar brain areas as in older children and adults. With this study we have lowered the age-boundary for localising the neural substrates of response inhibition to the first year of life.

Development of language-mediated selective attention in toddlers
Jelena Sučević[1] and Kim Plunkett[1]
[1]*University of Oxford*

Selective attention involves filtering of the available sensory information: relevant information is attended, while the interference from the remaining information is filtered out (Amso & Scerif, 2015). Inhibition of irrelevant information is considered crucial for development, as attentional selection without inhibition would be random (Amso & Johnson, 2005). Studies using paradigms such as negative priming and inhibition of return have demonstrated the development of spatially-mediated selective attention mechanisms during infancy and early childhood. However, while spatial priming effects on selective attention in young children have been shown, whether language has similar effects on selective attention is not well-understood. To address this question, we compare the impact of language and spatial priming on attention orienting. In a novel eye-tracking paradigm, two objects are presented in one of four possible locations and one of the objects is labelled (prime phase). The impact of labelling on attention orienting was tested in a following probe phase, where either the identity, location or both were manipulated. In the spatial version of the task, labelling was replaced by visual highlighting, which enabled us to compare the impact of language-mediated and spatial priming on selective attention. The study was conducted with 18- and 26-month-old toddlers. The results revealed that both language and spatial cues orient attention and shape the strength of encoding of the identity and location. Information attended during the prime phase facilitates attention orienting during the probe phase while ignored features are inhibited. Interestingly, language-mediated attention affects the probe phase in a way different from spatial priming. Language-mediated attention can override these inhibitory effects, while no such effect was observed for the spatially-mediated attention, revealing that language helps overcome inhibition of the previously ignored object, particularly in the older age group.

Session 2: Language Acquisition

([Click here to join the live meeting](#))

Language-specific label-referent mapping and disambiguation in 4-month-old infants

Amanda Saksida[1] and Alan Langus[2]
[1]Institute for Maternal and Child Health - IRCCS "Burlo Garofolo" – Trieste, [2]University of Potsdam

The words that infants hear occur in situations where more than one meaning is always possible. Before infants can learn the meaning of words they must be able to constrain this space of alternative hypotheses, an ability that is observed in experimental settings only after infants' first birthday (1-4). However, infants at that age already know many common nouns as well as words belonging to other grammatical gategories (5-7), suggesting that label-referent disambiguation should emerge considerably earlier than currently thought. Here we therefore designed a novel eye-tracking paradigm to test label-referent mapping and disambiguation in 4-month-old Italian infants (N=48). In each trial (N=24), infants were first briefly familiarized with an abstract object accompanied with an auditory label, followed by a test phase where the familiar object and a novel object were shown side by side. The test objects were accompanied either by the same auditory label heard during the familiarization, a novel auditory label or no auditory label at all. The auditory labels were either bisyllabic nonce words (Experiment 1) or sinewave analogues of the same linguistic stimuli (Experiment 2). The results show that infants looked longer to the familiar object when hearing the familiar linguistic label and to the novel object when hearing novel linguistic label, but showed no looking-time preferences in the silent control condition (Experiment 1). Furthermore, while no referential looking to correct visual targets emerged with sinewave speech (Experiment 2), infants' pupillary response indicates that they did discriminated between familiar and novel auditory labels in both experiments. By 4-months-of-age infants can therefore rapidly map linguistic labels to visual objects and use this knowledge to resolve ambiguities in label-referent mapping. The ability appears to be specific to linguistic labels and cannot be explained by perceptual familiarity/novelty of the stimuli alone.

Prelexical infants' abilities to represent regularities in speech: a near-infrared spectroscopy study

Irene de la Cruz-Pavía[1,2] and Judit Gervain[3,4,5]
[1]University of the Basque Country UPV/EHU, [2]Basque Foundation for Science Ikerbasque, [3]Università di Padova, [4]CNRS, [5]Université de Paris

To acquire grammar, infants need to extract regularities from the linguistic input. From birth, infants detect repetitions from speech. Newborns show a strong neural activation (as compared with a silent baseline) for syllable sequences containing adjacent repetitions (ABB: mubaba). Meanwhile, their activation in response to random syllable sequences (ABC: mubage) is not different from their response to the silent baseline (Gervain et al. 2008, PNAS). Here, we seek to uncover when infants begin to also represent the random sequences, i.e. sequences containing a diversity-based rule. Because infants begin to learn their first word forms at 6 months of age, we hypothesize that the ability to represent sequences of different syllables might become important for them. We examined 6-month-old French learning infants' (n=24) representation of repeated and random sequences in speech using NIRS and an alternating/non-alternating design. Infants listen to two types of blocks. Non-alternating blocks (x6) contained only tokens of a single structure, either ABB (e.g. tofifi) or ABC (e.g. dufeto). Alternating blocks (x6) contained tokens of both types presented in strict alternation (e.g. ABC-ABB: zimuta, fibaba…). If infants discriminate the two structures, their neural response to the alternating and non-alternating blocks should differ. Cluster-based permutation tests revealed an advantage for non-alternating blocks in right frontal regions, showing that infants discriminated the two sequence types. Crucially, analysis of only non-alternating blocks revealed equally strong neural activation to the blocks containing only ABB or only ABC tokens, higher than during the silent baseline. While newborns show high activation only in response to repetition-based (ABB) structures, 6-month-olds show similar activation in response to diversity-based (ABC) structures. Behavioral studies have failed to detect diversity-based rules even at 12 months (Kovács 2014, Lang Learn). Our results provide thus the earliest evidence that young infants encode diversity-based patterns, i.e. represent difference, in speech.

Three-year-olds' comprehension of contrastive and descriptive adjectives: Evidence for contrastive inference

Jamie Lingwood[1], Catherine Davies[2], Bissera Ivanova[3] and Sudha Arunachalam[4]
[1]Liverpool Hope University, [2]University of Leeds, [3]Aix-Marseille University, [4]New York University

Previous research suggests that pre-schoolers do not always integrate adjectives and nouns and may instead over-rely on noun information when processing referring expressions (Fernald et al., 2010; Thorpe et al., 2006). This disjointed processing has implications for pragmatics, apparently preventing under-fives from making contrastive inferences. Two visual world experiments investigated how English-speaking three-year-olds (N=73, Mage=44 months) process size adjectives across syntactic (prenominal; postnominal) and pragmatic (descriptive; contrastive) contexts. Experiment 1 used an established paradigm (Huang & Snedeker, 2013) and Experiment 2 used a novel experimental design that allowed children time to demonstrate their abilities in adjective-noun integration and in contrastive inference. Using growth curve analysis, we show that pre-schoolers are able to integrate adjectives and nouns to resolve reference accurately by the end of the referring expression in a variety of pragmatic and syntactic contexts and in the presence of multiple distractors. Crucially, by modelling the effect of pragmatic function (contrastive - where the prenominal adjective was informative, vs. descriptive - where it was not) on visual preference for the target object during the unfolding utterance, we reveal for the first time that when task demands are reduced, 3-year-olds show a stronger target preference during the adjective in the contrastive condition and greater distraction from the property competitor in the descriptive condition. Using both manifestations of contrastive inference, we conclude that young children can contrastively infer, given a slowed-down speed of presentation and visually enhanced size contrasts. Our findings provide novel evidence for a continuity in young children's pragmatic development. By analysing high-resolution online data in response to stimuli that require integration of an adjective with a noun, in younger children than have been tested before, we show that children can coordinate lexical, referential, and pragmatic information to interpret language in real time.

Session 3: Speech Processing

([Click here to join the live meeting](#))

Development of Cortical Specialisation for Visual and Audiovisual Speech Processing in infancy

Aleksandra Dopierała[1], David López Pérez[2], Evelyne Mercure[3], Agnieszka Pluta[1,4], Tomasz Wolak[4] and Przemysław Tomalski[1,2]
[1]Warsaw University, [2]Institute of Psychology, Polish Academy of Science, [3]Goldsmiths University, [4]Institute of Physiology and Pathology of Hearing

From an early age, infants process speech audiovisually. By five months of age, they can match auditory and visual syllables and detect incongruence in McGurk stimuli (1,2); between 8 and 10 months of age, they become increasingly knowledgeable about native speech sounds (3) and start to show adult like neural responses to incongruent audiovisual syllables (4). However, it remains unknown how this emerging specialisation for audiovisual speech integration and visemes develops on a cortical level. In two cross-sectional studies, we measured 5- and 10-month-olds' (study 1 N=42, study 2 N=41) fronto-temporal responses to audiovisual and visual speech using fNIRS. Infants watched either synchronous and asynchronous (660ms lag) audiovisual syllables (study 1) or silent syllables and non-communicative mouth movements - gurns (study 2). We used multivariate pattern analysis (MVPA, 5) to decode patterns of cortical responses to the presented conditions. The right hemisphere activation patterns during synchronous and asynchronous speech were classified at a level significantly greater than chance at five months of age, but not at ten (A). On the other hand, bilateral fronto-temporal activation patterns to visual speech and gurning processing were successfully classified at ten months of age, but not at five (B). Analyses of relative channel weights revealed that right frontal (study 1, C) and bilateral temporal (study 2, D) regions contributed most to successful classifications. This study shows that initially, audiovisual speech integration is supported by low-level mechanisms, as infants do not have specific cortical representations of visemes. By ten months of age, infants' cortical representations of visemes become dissociable from gurning. The audiovisual speech integration network becomes re-organised, as infants start to rely on higher level mechanisms of audiovisual integration.

The trajectory of speech perception development: Investigating event-related potential Mismatch Responses to different speech and non-speech features in infants of 2, 6 and 10 months

Annika Werwach[1], Claudia Männel[1,2,5], Hellmuth Obrig[1], Angela D. Friederici[3] and Gesa Schaadt[4,5]

[1]*Universität Leipzig,* [2]*Charité–Universitätsmedizin Berlin,* [3]*Max Planck Institute for Human Cognitive and Brain Sciences,* [4]*Freie Universität Berlin,* [5]*Max Planck Institut for Human Cognitive and Brain Sciences*

Infants rapidly advance in their speech perception, reflected in the transition from an immature, positive-going to an adult-like, negative-going electrophysiological mismatch response (MMR) in auditory deviancy detection. Since the infant MMR's characteristics have been linked to inter-individual differences in language development, it has been discussed as a potential predictor of impending language difficulties. Indeed, various studies reported associations with later language difficulties for MMRs to different types of auditory information at different time-points across development. However, in order to reliably utilize the infant MMR as a predictive measure for later language development, a systematic investigation of the MMR's maturation depending on stimulus-type is needed. As a first step, we longitudinally explored the maturation of the infant MMR to deviation in speech and non-speech features. In a multi-feature paradigm, we obtained MMRs to consonant, vowel, vowel-length, and pitch changes, when infants (n = 59) were 2, 6 and 10 months old. To specifically tackle the maturational trajectory of the respective MMRs, we applied second-order latent growth curve models. Results showed positive-going MMRs to all deviant types and across all assessment points, typically observed in infants. However, MMR amplitudes decreased over time towards a negativity in differently shaped growth curves for each deviant type. The pitch and vowel-length MMRs decreased linearly across age, becoming more negative; the consonant MMR initially became more negative, then stabilized between 6 and 10 months; while the vowel MMR showed a u-shaped trajectory, first increasing (more positive) until 6 months and then declining until 10 months (more negative). These results demonstrate that infant speech discrimination matures in different rates and amplitude trajectories across the first year of life, depended on the studied feature. We thus argue that the MMR's stimulus-dependent maturational trajectory needs to be considered when aiming for reliably predicting later language development.

Under-resourced or overloaded? Rethinking working memory deficits in developmental language disorder

Sam Jones[1] and Gert Westermann[1]
[1]Lancaster University

Dominant theoretical account of developmental language disorder (DLD) are unanimous in assuming working memory capacity limitations (e.g. Montgomery et al., 2019). In the current report, we present an alternative view: That working memory in DLD is not under-resourced but overloaded due to operating on auditory-linguistic representations characterised by low discriminability. This account is developed through computational simulations involving convolutional neural networks trained on spoken word Mel spectrograms, in which frequency information was either retained or degraded to mimic low-level frequency discrimination deficits reported in DLD. We assessed not only speech recognition accuracy and predictive entropy, but also used mean-field-theory based manifold analysis to assess networks' classification capacity; a proxy for executive control operationalized as the number of linearly separable word manifolds per feature, per layer (Stephenson et al., 2020). We show that instantiating a low-level frequency discrimination deficit results in models struggling to reduce the dimensionality of the internal speech representations formed, and that classification capacity is overwhelmed as a consequence of poor underlying representation separability. These underlying deficits relate not only to lower performance accuracy in the simulated spoken word recognition task, but also to greater hesitancy even when making accurate predictions (i.e., higher entropy, lower probability predictions), which parallels the increased response latencies and word finding difficulties often reported among children affected by DLD. These simulations illustrate how apparent working memory capacity limitations can emerge as a consequence of speech representation deficits, challenging the status of working memory capacity limitations as an indispensable feature of causal theories of DLD.

Session 4: Adult-Child Interactions

([Click here to join the live meeting](#))

Teachers Matter: The Effect of Teacher Behaviours on Executive Function Development of Toddlers

Sümeyye Koskulu[1], Hanna Mulder[1], Eva van de Weijer-Bergsma[1] and Elma Blom[1]
[1]Utrecht University

Although the effect of teacher behaviours on executive function (EF) development has been studied in children aged 4 years and older, this topic is understudied in younger children. We examined whether the quality of teacher-child interactions is related to EF development of children in toddlerhood. A sample of 876 children and 215 teachers participated in a two-wave study (when children were 2 and 3 years old respectively). Emotional, Behavioural, and Instructional Support of teachers were observed at the first wave using the Toddler version of the Classroom Assessment Scoring System (La Paro et al., 2014). EF performance of children was assessed at both waves through an EF battery developed for toddlers. Preliminary Structural Equation Modelling results revealed that, controlling for child characteristics and demographics, Instructional Support of teachers positively predicted the change in EF scores of toddlers from age 2 to 3. Emotional and Behavioural Support of teachers were not related to EF change. Follow-up analyses showed that the type of institution (i.e., preschool vs. day-care centre) children attended moderated the relationship between teacher behaviours and EF change scores. That is, when teachers' displayed high levels of emotional, behavioural, and instructional support, children in preschools demonstrated greater changes in their EF performances while children in day-care centres showed changes in EF to a lesser extent. Explanations for these results include differences in characteristics of the teachers (e.g., preschool teachers demonstrated higher levels of supportive behaviours than day-care teachers) and children (e.g., preschool children had lower EF scores at the first wave, lower parental education than day-care children) across the different institution types. This study contributes to the emerging evidence that teacher behaviours are important for EF development of toddlers and suggest that these effects may differ depending on the context in which they are assessed.

How Verbs are Represented in Caregiver-infant Interactions

Hanwen Vivian Zhang[1], Lucas Chang[2] and Gedeon Deak[2]
[1]Cornell University, [2]University of California

To understand how infants might acquire statistical information about language through input, previous research has focused on words with concrete referents: object-labeling nouns. The linguistic contexts in which a noun tends to occur can help children induce its grammatical category (Minz, 2003). The embodied contexts of caregivers' and infants' attention or action when caregivers produce utterances are also important (Yu & Smith, 2012). However, little is known about words with more dynamic or contextually dependent meanings, like verbs (Maguire et al., 2006). To investigate how verbs are represented in infant everyday interactions, we queried a database of naturalistic in-home caregiver speech. From this dataset we (1) calculated the co-occurrences of different verb types with both linguistic and embodied contexts, and (2) applied hierarchical clustering to verbs based on these co-occurrences. Forty-two caregivers and their 12-month-old infants were video-recorded in 15-min free play sessions. From full transcriptions we examined the 51 most frequent verbs, classified according to meanings and usage features, including: movement, object-oriented action, perception/cognition, volition, transitive and auxiliary. For contexts, we included 17 frequent pronouns, infants' looking and holding targets, infant locomotion, and caregivers' holding target (Table 1). We tested whether the verb categories and each context co-occur significantly more or less frequently than chance. We found that movement verbs were characterized by low co-occurrence with deictic pronouns and with infants' object handling, indicating that movement was negatively related to object play. Moreover, the play context also afforded separability of mental verbs: verbs of perception/cognition were more associated with first-person pronouns whereas verbs of volition with second person pronouns, consistent with Laakso and Smith (2007). The clusters of verbs are consistent with verb usages, and support future predictions of Age-of-Acquisition data. Although verbs are abstract, their usages can nevertheless be bootstrapped by information in the environment.

Session 5: Vocabulary Development

(Click here to join the live meeting)

Tablet assessment of word comprehension reveals coarse word representations in 18–20-month-old toddlers

Audun Rosslund[1], Natalia Kartushina[1], Julien Mayor[1], Jun Ho Chai[2] and Chang Huan Lo[2]
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The aims of the current work were two-fold: (1) examine the alignment between direct and indirect (parental reports) measures of word comprehension in toddlers (Tomasello & Mervis, 1994), and (2) assess the role of semantic relatedness between items on word comprehension (Arias-Trejo & Plunkett, 2010). Forty-nine 18–20-month-old Norwegian toddlers performed a touch-based word recognition task, in which they were prompted to touch the labeled target out of two items displayed side-by-side on a tablet. The distractor item was either semantically related (e.g., dog–cat) or unrelated (e.g., dog–airplane) to the target (for more information, see Lo et al., 2021). 21 toddlers were tested in-laboratory and 28 toddlers at home through a custom-based online testing platform. Our results show that toddlers as young as 18 months can engage meaningfully with a tablet- based assessment, with minimal verbal instruction and child–administrator interaction. Mixed-effect models showed that toddlers performed better in the semantically unrelated condition than in the related condition, $\chi2 = 6.78$, $p = .009$, suggesting that their word representations are still semantically coarse at this age. Furthermore, parental reports of word comprehension predicted toddlers' performance, $\chi2 = 18.10$, $p < .001$, with parent–child agreement stronger in the semantically unrelated condition, indicating that parents declare a word to be known by their child if it is understood at a coarse representational level. This study provides among the earliest evidence that remote data collection in toddlers is viable, as comparable results were observed from both in-laboratory and online administration of the touchscreen recognition task. Importantly, it provides support for the validity of parental reports of vocabulary, and emphasizes the importance of balancing item characteristics when using target-distractor recognition tasks.

A study of linguistic distance and infant vocabulary trajectories using bilingual CDIs of English and one additional language

Serene Siow[1], Nicola Gillen[1], Irina Lepadatu[1], Daniela Avila-Varela[2], Gonzalo Garcia-Castro[2], Nuria Sebastian-Galles[2] and Kim Plunkett[1]
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When studying cross-linguistic similarity, we can define similarity at two levels: the language level (language typology) and the word level (cognateness). Floccia et al (2018) found that linguistic distance between bilingual toddlers' two languages predicted vocabulary outcomes in expressive and receptive vocabulary, suggesting that similar languages are easier to learn. Our study expands on this research question using a wider age range and larger vocabulary inventories with high translation overlap. Our sample was 12 to 36-month-old bilingual toddlers growing up with English and one additional language (AL) (Dutch, French, German, Italian, Polish, Portuguese or Spanish). To measure bilingual vocabulary size, we collected Communicative Development Inventories (CDIs) in English and the AL for each child. For the analysis on language-level similarity, we compared the total vocabulary size (English vocab + AL vocab) of children whose AL belongs to the same or different language family as English, controlling for age. If more similar languages are easier to learn, we expect that bilingual children learning a Germanic language (which is closest to English), should have the largest vocabulary size, followed by a Romance language (moderate overlap) and lastly a Slavic language (little overlap). This vocabulary size advantage is expected to be driven by joint phonological and conceptual overlap between words in the two languages. We therefore expect that the vocabularies of Germanic language learners will contain more translation equivalents (cross-linguistic word pairs with the same meaning) than learners of more distant languages. We observed the expected trend of language family and total vocabulary size, although the main effect was only significant between Germanic and Slavic languages. We also found significant main effects of language family on the percentage of translation equivalents in the expected direction. Future directions will look at the effect of cognateness on vocabulary acquisition.

See it, say it? How receptive and expressive vocabulary predict picture comprehension over time in typically developing and late talking children
Rachael W Cheung[1], Calum Hartley[1] and Padraic Monaghan[1]
[1]*Lancaster University*

Humans rely on using symbols to communicate, and infants are exposed early to pictures as symbols. Although linguistic information alongside perceptual similarity can help children relate pictures to real objects within experimental tasks (Callaghan, 2000; Ganea et al., 2009), few have examined how emergent language abilities affect children's understanding of pictures. Late talkers (LTs) offer a unique opportunity to understand how expressive and receptive vocabulary may affect picture comprehension, as although LTs have low expressive vocabulary, they are otherwise typically developing. In a longitudinal study of typically developing children (TDs; n = 38) and late talkers (LTs; n = 21), we assessed picture comprehension and language ability at 2.0 – 2.4-years-old and 3.5 – 3.9-years-old. We modified Callaghan's (2000) task, manipulating label availability and using general linear mixed effects models to predict task accuracy. We found that although there was a small advantage of TDs over LTs on task performance over time (p = .025), there were no functional differences between the populations. This suggests although LTs may have delayed picture comprehension in general, they still use language to scaffold their understanding of pictures. Furthermore, across all participants, picture comprehension was predicted by receptive language at ~2-years-old (p = .040), and this effect was mediated by social ability (p = .020). At ~3.5-years-old, however, picture comprehension was predicted by expressive vocabulary (p <.001). Social ability plus receptive vocabulary may thus play a stronger role in picture comprehension at an earlier age, whereas at an older age, this may be superseded by the ability to talk about pictures. Our results suggest that receptive and expressive vocabulary may scaffold picture comprehension differently at different stages of development, subject to mediating effects of social ability. This also offers evidence for theories highlighting social scaffolding as crucial to children's understanding of symbols.

Session 6: Rhythmic Processing

(Click here to join the live meeting)

On the role of infants' multimodal rhythmic movements in triadic interactions with their caregivers

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Repetitive and rhythmically-organised movements of the arms and hands are a highly characteristic behaviour of infants' emerging skills during their first year of life. However, while prior research has evidenced that these behaviours possess a meaningful predictive validity for later communicative development, their role within adult-child interactions is still underexplored, especially on how they could be influenced by parental responsiveness. In this study, we explored the relationship between children's rhythmic movements with objects and how adults respond to them, focusing on the multimodal characteristics of triadic interactions and how they are synchronised. We hypothesised that children accompanying their rhythmic movements with multimodal cues will stimulate their parents' responses. We observed 22 infants (10 male, 12 female) at 9 months of age during a free play situation in a familiar setting with their mother or father. Adult and child were video-recorded for 12-15 min playing on the floor with the same standard set of toys (blocks, cars, animal figures, eating sets and picture books). We coded children behaviours and parental responses within a 3-s window after the child's rhythmic movement, and analysed the extent to which adults' responses followed the child's focus of attention and the type of response they prompted. Findings show that infants' multimodal rhythmic movements increased the probability of adult responding. Adult responses often followed the child's focus of attention, especially if the child accompanied the rhythmic movement with vocalisations. Referential cues (i.e. naming, comment and affirmative utterances) were the most frequent, followed by questions, and directive responses/prohibitions. These dynamics could support the development of early communicative behaviours by promoting joint attention frameworks.

The temporal structures of mother and infant vocalizations are bursty and converge during natural activity at home

Catalina Suarez-Rivera[1,2], Drew Abney[3], Katelyn Fletcher[1]and Catherine Tamis-LeMonda[1]

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Infants are active language learners who decode language from communicative exchanges with social partners; they learn rules and pragmatics of language from the speech they hear and produce. However, learning itself unfolds in time and the temporal schedule of vocalizations may have a distinctive signature that conforms to infant learning mechanisms. Vocalizations can take on a number of possible temporal patterns like clusters of activity (bursty) or rhythmic activity with equal intervals of silence between activity (periodic). Here we uncover the temporal structure of mother and infant vocalizations during everyday activities in the home environment. We adapted the Burstiness measure to quantify temporal structure and differentiate "bursty" profiles from periodic or random profiles. Fifty-three mother-infant dyads were video-recorded during natural activity at home for 2 hours. Mother and infant language was transcribed in Datavyu in utterances separated by grammatical closure and pauses. Burstiness (Kim & Jo, 2016) was calculated for each speaker by finding the "time spans" between the onsets of adjacent vocalizations and computing a 'B', for burstiness, value. Burstiness values range from -1 (periodic) to +1 (bursty). Analyses operated on 144,686 vocalizations total (66% produced by mothers). Temporal profiles of infant and mother vocalizations were bursty as infant and mother B values averaged 0.34 and 0.32, respectively. Notably, observed B values for infant and mother vocalizations were significantly greater than simulated B values for random patterns of vocalizations. Further, mother and infant burstiness estimates were correlated ($r = 0.58$, $p<.001$), indicating individual-level correspondence in the temporal structure of infant and mother vocal productions. Ongoing analyses investigate the role of conversational turn-taking in determining the correspondence between infant-mother temporal patterns of vocalizations. Mothers and infants produce bursts of vocalizations interspersed with silence and show similarity in the interval structure of their communications.

Cortical tracking of simple rhythmic stimuli across the first year of life

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Infant-directed speech (IDS) is a special type of stimulus. Preferred to adult-directed speech (ADS) by infants across many cultures and languages (Byers-Heinlein et al., 2021), it is thought to play a role in language acquisition. Acoustic differences between IDS and ADS offer some clues to the potential benefits of "baby talk". The slowest modulations of the IDS amplitude envelope contain more energy than in ADS, and these modulations correspond to the slower components of speech, specifically syllables and stress (Leong et al., 2017). The syllable and stressed syllable rates of speech correspond to the canonical delta (~1-3Hz) and theta (~4-8Hz) EEG bands. Neural oscillations track the amplitude envelope, and tracking accuracy has been linked both to adults' speech comprehension (Doelling et al., 2014) and to childhood language difficulties (Power et al., 2016). To examine whether cortical tracking in infancy might relate to language acquisition, the BabyRhythm project followed 113 infants from two months of age to two and a half years. We study changes in rhythmic neural and motor responses to speech and song in the first year, and will examine how these early measures relate to toddlers' production and comprehension of language. In one EEG paradigm, infants were played repetitive 2Hz speech and nonspeech stimuli at the ages of two, six, and nine months of age. The aim was to examine whether cortical tracking occurred in response to these stimuli, and if it changed with age. Six- and nine-month-old infants show significant increases in 2Hz power for both stimuli relative to a silent resting state condition (Drumbeat: $\beta = 0.598$, $p = 0.027$; Syllable: $\beta = 0.712$, $p = 0.008$), with no significant age-related changes. The next step will be to examine inter-trial coherence and preferred phase, to understand the temporal relations between the stimulus and the neural response.

POSTER SESSION 1

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Gather map of Poster Room A
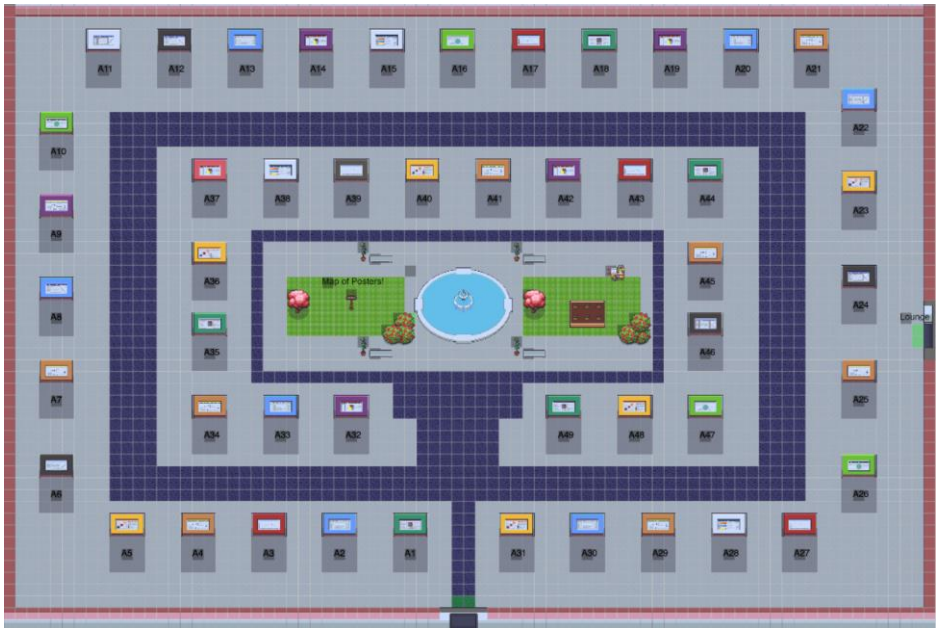
A1 Supporting an ecological perspective for children's transition from Pre-school to Primary School
Gillian Lake[1]
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There is a paucity of information transfer between preschools, primary schools and parents when children are transitioning from preschool to primary school in Ireland (O'Farrelly & Hennessy, 2013; 2014; O'Kane, 2016). Current optional templates are paper-based and generic. Parents are not often involved in this process. This transition period can shape the way children deal with change in later life, it can affect their social and emotional development, their resilience and how they go on to regard school (O'Farrelly & Hennessy, 2013). Software solutions could be used in order to bridge the information gap between parents, early years professionals (EYPs) and primary teachers and help to develop a shared responsibility for children's well-being during this significant period. Forty-nine EYPs, 92 parents and 48 primary teachers completed online questionnaires using Qualtrics XM to ascertain their perceptions and understandings of transition, the sharing of information and the use of technology to support children during this period. Follow-up focus groups and semi-structured interviews were conducted with a sub-sample of professionals, parents and primary teachers. Quantitative data was analyzed using SPSS and a thematic analysis was conducted on the transcribed qualitative data. Results showed that EYPs, parents and primary teachers agreed that information sharing should be based on three themes: Language, Social and Emotional development (including strengths and interests of the child) and adapting to more formal environment of primary school. Results also showed that parents have a desire to be more involved in this period and believe software can help. This resultant data has been used by an industry partner to develop a new transitions software solution which captures, and shares information deemed relevant by each of the three stakeholders. It supports an ecological perspective on transition to primary school (Rimm-Kaufman & Pianta, 2000).

A1 Teams Channel

A2 Syntactic prediction adaptation accounts for language processing and language learning

Naomi Havron[1], Mireille Babineau[2], Anne-Caroline Fiévet[3], Alex de Carvalho[4] and Anne Christophe[3]

[1]University of Haifa, [2]University of Toronto, [3]ENS, PSL University, [4]Paris Descarte

According to error-based learning models, children constantly predict what their interlocutors would say next, and when their predictions fail, they correct the model they rely on for prediction to better fit upcoming input. These theories predict that the adaptation process would operate in the same way in language processing and language learning (Chang, Dell, & Bock, 2006; Chang, Kidd, & Rowland, 2013; Rabagliati, Gambi, & Pickering, 2015). Error-based learning models also predict that children, whose prior knowledge is less robust, should be more prone to change their predictions in the face of prediction error (Peter, Chang, Pine, Blything, & Rowland, 2015). While interest in error-based models or in adaptation to linguistic context (henceforth, prediction adaptation) has been extant, direct evidence for these two key hypotheses remains scarce. First, there is little research directly comparing language processing and learning. Second, while there is some evidence for developmental changes in prediction, there are no studies comparing prediction adaptation across age groups. The current study tested whether 20-28-month-old toddlers and 3-4 year-old pre-schoolers could use prediction adaptation to disambiguate words that are ambiguous between a noun and a verb interpretation. We tested French children using the phrase la petite followed by a homophone that could be interpreted as either a noun or a verb. Children were assigned to a noun group or a verb group. Before test, the noun group was exposed to sentences where la petite predicted nouns, and the verb group to sentences where la petite predicted verbs (see Fig. 1). At test, three- to four-year-olds from the verb group looked at the verb interpretation longer than the noun group, but two-year-olds did not. A statistical comparison with a previous study found that the effects were similar across learning and processing.

A2 Teams Channel

A3 Predicting explicit memory for meaningful cartoons from visual paired comparison in infants and toddlers

Osman Kingo[1], Trine Sonne[1] and Peter Krøjgaard[1]
[1]Aarhus University

Developmental scientists have long been interested in infant looking behavior because it provides a window into the perceptual and cognitive world of the preverbal human infant. In the study of memory in infancy, the Visual-Paired Comparison procedure (VPC) in particular has been a popular method of choice for researchers, since it does not rely on verbal instructions, but also because it has proven to be viable for a very broad age-range of participants from infancy to adulthood. With the present study, we sought to investigate how VPC relates to clear-cut and verbally prompted explicit memory in a broad age-range of children. We tested 18-, 33-, and 39-month-olds' (N = 120) memory for dynamic stimulus material (simple cartoons) after six months in a VPC task. We also tested explicit recognition memory (ERM) for the same material. Only the oldest age group (39-month-olds) showed a significant visual (familiarity) preference at the test. Similarly, only the oldest group reliably chose the correct cartoon in the ERM test. Data from the VPC and ERM tasks did not correlate in any age group. However, we suggest a novel score (coined ΔVPC) measuring how much visual preference changes during the test phase in the VPC task. We find that this ΔVPC score (and vocabulary) predicts children's performance in the ERM task whereas other potential predictors such as age or conventional novelty preference do not. I will discuss the impact of these findings in relation to the development of implicit and explicit memory. Furthermore, we propose that VPC measures are associated with explicit memory only when the participants process the stimuli conceptually. In such cases, we suggest that the ΔVPC score is an approximation of how demanding it is to construct the mental representation of the familiar stimulus during the test phase.

A3 Teams Channel

A4 "It's just a LEGO bird. The curly lady gave it to me!" A Diary Study of Spontaneous Memories in 34- to 36-month-old children

Tirill Fjellhaugen Hjuler[1], Trine Sonne[1], Osman Skjold Kingo[1], Dorthe Berntsen[1] and Peter Krøjgaard[1]
[1]Aarhus University

The purpose of the present diary study was to investigate young children's spontaneous memories as they naturally occur in their everyday environment. Krøjgaard et al. (2014) defined spontaneous memories as being (I) verbally produced, (II) socially unprompted, and (III) typically environmentally cued. To date, only a single previous diary study has focused exclusively on spontaneous memories in young children (Reese, 1999). The present study seeks to expand on previous findings by means of parental reports of their children's spontaneous memories in a diary study. Parents registered their children's spontaneous memories during a two-week period in two steps: 1) in a notebook and subsequently; 2) in a detailed online questionnaire assessing aspects including cues present at retrieval, valence and age of the remembered event. One week after completing the diary, the experimenter asked the children open-ended questions about the last three spontaneous memories. The results showed that the most prominent cues triggering spontaneous recall were 'objects' (32 %) and 'something said' (30.3 %). The valence of the memories was typically positive, and the age of the memories revealed a clear forgetting curve. Interestingly, the children struggled to strategically recall and answer questions about their recently reported memories. This result is in accordance with recent experimental evidence showing that whereas 35- and 46-month-olds were equally capable of spontaneously recalling a staged event experienced one week earlier, the 35-month-olds were clearly worse than their older peers when asked to strategically recall the event (Krøjgaard et al., 2017; Sonne et al., 2020). We are currently in the process of coding answers from the children, who in the present study were capable of adding details when answering the questions.

A4 Teams Channel

A5 Interaction between auditory and speech processing during early development

Laurianne Cabrera[1]
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Learning a language requires to identify the acoustic properties of the speech signal that have a functional role. The signal of speech is a highly complex acoustic signal, whose spectral and temporal properties convey linguistic information: phonetic and prosodic information. We are now fully aware that during the first year of life perceptual mechanisms for speech evolve under the influence of the environmental language. However, it is not clear whether and how language exposure influences infants' reliance upon specific acoustic properties of the speech signal. In a series of experimental studies, we explored the role of the auditory mechanisms in the perceptual attunement for the native language. For this purpose, we used a psychoacoustic model describing how the auditory system extracts the spectral and temporal modulation components of the speech signal. Using this auditory approach, we explored how infants rely on the spectro-temporal modulations of speech to make phonetic distinctions. We used behavioural techniques (i.e., looking time recordings) between 6 and 10 months of age and a cross-linguistic design to investigate how exposure to the native language (French vs Mandarin) influences this processing. Results indicate that at 10 months, when infants start to be attuned to the speech categories of their native language, the role of the acoustic modulations of speech is different as a function of the native language. More precisely, the fine spectro-temporal modulations conveying salient voice-pitch information are more important for Mandarin 10-month-old infants, while the slow modulations are sufficient for French 10-month-olds to distinguish a speech contrast. Investigating speech perceptual organization from an auditory perspective will add to our understanding of how the auditory system analyses and organizes the acoustic information of speech sounds during development.

A5 Teams Channel

A6 The use of speech temporal cues in phonetic processing: an electrophysiological study with infants and adults

Monica Hegde[1] and Laurianne Cabrera[1]
[1]Université de Paris

Before 10 months of age, infants are not yet attuned to the consonant contrasts of their native language, meaning that, compared to adults, they are sensitive to certain non-native phonological contrasts. The nature of the mechanisms shaped by age and exposure to the native language is yet to be discovered. The current project hypothesizes that auditory mechanisms supporting speech perception may play a crucial role in perceptual attunement. The project aims to explore the interaction between auditory and speech perception abilities during early development by looking at the neural correlates underlying the processing of specific speech acoustic cues. This study adopts a psychoacoustic approach suggesting that the auditory system decomposes selectively the spectral and temporal modulations of speech. Those acoustic modulations of speech can be artificially manipulated using vocoders to assess the role of amplitude and frequency modulation cues (AM/FM) in speech perception. Recent studies have suggested that 6-month-olds weight fast AM cues more heavily than adults for consonant perception. To explore the neural underpinnings of this development, we used electroencephalography (EEG) to measure the cortical auditory evoked potentials underlying auditory detection of native and non-native consonants in French-learning 6-month-old (N=20) and French adult listeners (N=20). We used vocoders to process three syllables: French-voiced /aba/, French-unvoiced-unaspirated /apa/, and an English-unvoiced-aspirated /ap h a/. Three vocoder conditions were designed to preserve: i) original FM and AM, ii) original AM, and iii) only the slowest AM. Thus far, our analyses show that 6-month-olds and adults show similar neural responses when FM and fast AM cues are degraded. They, however, do not show the same pattern of results as a function of consonant type. Data collection for 10-month-olds is still in progress and may reveal whether perceptual attunement relates to significant changes in auditory processing of speech.

A6 Teams Channel

A7 A biological gender approach to English first language development of complex predicates

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This study examines whether English monolingual girls differ from English monolingual boys in the acquisition of English dative alternation (DA) structures (to/for-datives (1a) and double object constructions (DOCs) (1b)).

(1) a. John gave a book to Mary (to-dative)
b. John gave Mary a book (DOC)
[Larson 1988: 343-353]

Considering these predictions, English monolingual girls are expected to present an earlier emergence and, possibly higher frequency rates in the production of English DA, when compared to English monolingual boys' data (Cornett 2014; Lovas 2011), regardless of the syntactic relation between DOCs and to/for-datives. We also investigate whether the exposure to English DA from the adult input shows differences in the girls' output and in the boys' output, as also attested in earlier acquisition works (Clearfield and Nelson 2006). In order to shed light on these issues, we analyze data from eight English monolingual girls and five English monolingual boys, and the adults that interact with them, as they appear in the CHILDES database (MacWhinney 2000). Our findings reveal that monolingual girls ($t(6) = -2.071$, $p = .077$) do not differ from monolingual boys ($t(3) = 2.231$, $p = .155$) in the ages of onset of the two English DA constructions, which suggests the two biological gender groups have acquired the syntactic non-derivational relationship between DOCs and to/for-datives (Marantz 1993; Mulder 1992; Snyder and Stromswold 1997). Furthermore, biological gender differences are not seen in the acquisition of the additional properties required in the production of to/for-datives, given the later onset and the lower incidence of these constructions when compared to DOCs. These production patterns could also be explained by the frequency with which these structures are heard in the adult input in the two biological gender groups.

A7 Teams Channel

A8 Manual behavior in newborns and infants from birth to three months old

Priscilla Ferronato[1], Edison Manoel[2] and Luiz Dantas[2]
[1]Paulista University, [2]University of São Paulo

There is more to manual behavior in newborns and infants up to three months old than eye-hand coordination. Early manual behavior may be involved in identifying regularities between hand and digits' movements and their outcomes. In this study, we describe changes in the way infants, from birth to three months old, clutched a rod and propose that this might be related to active hands' exploratory behavior. Fifty-one infants took part in the study and they were divided into 4 groups: three-day-old (n=17), one-month-old (n=9), two-month-old (n=11), and three-month-old (n=14). Their hands' exploratory behavior was inferred from clutching behavior shown during a two-minute baseline condition carried out in a quiet room. The infants were sitting on an adapted baby chair when a rubber rod, similar in size and shape to an adult's finger, was placed into the infants' palms and taped, inducing a palmar grasp followed by clutching behavior. The rod had a built-in transducer that allowed the measurement of hand pressure used to calculate the mean and standard variation (SD) for multiple dependent variables. A Kruskal-Wallis analysis revealed the age effect for number of clutches, clutch frequency, pressure SD and mean clutch duration. We found that, from birth to 3 months old, there was a clear trend which showed that as infants age they clutch more often, faster, and with increasing variability. At the same time, the mean and peak pressure exerted over time remained stable. We discussed these results as being indicators that during the first three months infants increase their behavior variability to explore objects, when is given the opportunity, learn about the functions of their body, and to identify regularities between actions and their consequences.

A8 Teams Channel

A9 Infants' spontaneous communicative bids for information: Secondary data analysis of longitudinal child-caregiver free play home observations at 11-30 months

Marina Bazhydai[1], Maddy Anderson[1], Ellie Bradeley[1], Katherine Twomey[2] and Samantha Durrant[2]
[1]Lancaster University, [2]University of Manchester

As active explorers of the environment, infants not only seek information through autonomous means (e.g., visually or manually), but also engage their social partners to actively facilitate their information gain. The precise behaviours that index infants' curiosity in active social learning are the focus of the current study. Infants' spontaneous communicative bids for information in natural social interactions have been under-investigated (for recent reviews of experimental research, see Begus & Southgate, 2018; Harris et al., 2017; Lucca, 2020; Ronfard et al., 2018). Here, we aim to investigate the developmental trajectory of infant-initiated information-seeking behaviours unfolding between 11, 18, 24, and 30 months of age. By applying a novel fine-grained coding scheme to the free play home video observations of 60 infants (collected longitudinally as part of the LuCID 0-5 ESRC project, https://osf.io/kau5f), we will characterise and track developmentally a broad range of explicit and implicit information-seeking behaviours, such as social referencing, pointing and hold-out gestures, help-seeking requests, gestural and verbal uncertainty expressions, questioning intonation and posing verbal questions. We will also examine caregivers' correspondent responses to such communicative bids to answer the question whether they appropriately interpret and contingently provide the requested epistemic input (e.g., by naming objects, demonstrating object functions, explaining or clarifying, as compared to providing socio-emotional rather than epistemic responses, or ignoring the infant's request). Additionally, we will particularly focus on identifying the role of infant-initiated social gaze in such communicative bids and the level of uncertainty inherent to the free play activity during which information-seeking occurs. While broadly exploratory, the results of this research will shed light on individual and developmental trajectories of infants' active social learning in child-caregiver interactions.

T A9 Teams Channel

A10 Speech perception slopes across the first year of life: Maturation of consonant perception, but not vowel perception, predicts lexical skills at 12 months

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[1]Freie Universität Berlin, [2]Universität Leipzig, [3]Max Planck Institute for Human Cognitive and Brain Sciences, [4]Charité-Universitätsmedizin Berlin

Consonants and vowels differentially contribute to lexical acquisition across the first year of life, with a preferential role of consonants from around 8 months. Infants' differential reliance on consonants versus vowels in word recognition has been shown to predict later lexical outcome. This predictive value, however, has not been evaluated for infants' longitudinal trajectories of consonant and vowel perception. We here aimed to study brain markers that can capture perceptual changes before infants show vowel or consonant preferences in word recognition behaviorally. We examined longitudinally (at ages 2, 6, and 10 months) whether infants' (n= 59) maturation trajectories of vowel and consonant discrimination differentially predict their later lexicon. At each age, we measured infants' discrimination abilities in a multi-feature paradigm by means of electrophysiological mismatch responses (MMR) to consonant and vowel deviants. At 12 months, we assessed infants' lexical skills via the German version of the CDI (parental questionnaire). Using second-order latent growth models, we tested the maturation slopes of vowel and consonant MMRs as predictors of word production and perception at 12 months, controlling for the effect of individual MMRs at each assessment. The consonant MMR slope significantly correlated with word perception and production, whereas there were no effects for the vowel MMR slope. Note that only for consonants at 2 months, the single-time point MMR predicted later lexicon, while the MMR slope from 2 to 10 months had an additive predictive value. These results confirm a prominent role of consonant, but not vowel, discrimination for word learning from early on. Given that a behavioral preference for consonants in word recognition only evolves towards the end of the first year, our study points to a much earlier predictive value of consonant perception and to a particular role of the longitudinal maturation of this perceptual skill in lexical acquisition.

A10 Teams Channel

A11 Distinct environmental cues trigger spontaneous memories of past events in three- and four years old children even after long delays

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Spontaneous memories are memories that come to our mind, almost 'out of the blue', without any deliberate attempt to recall the events (Krøjgaard, Kingo, Dahl, & Berntsen, 2014). Recently, a novel paradigm has made it possible to induce and examine spontaneous memories in preschool children in an experimental setting (Krøjgaard, Kingo, Jensen, & Berntsen, 2017, Sonne, Kingo, Berntsen, & Krøjgaard, 2019, 2020) across a one-week retention interval. The aim of this study was to examine spontaneous recall across longer retention intervals, which has never been done before. Two hundred and twenty-seven children, aged 35 months old (n = 114) or 46 months old (n = 113), visited the lab twice. At the first visit, the children were exposed to one of two unique events. After either a 7-, 32-, or 91-days retention interval, the children returned to the lab for a second visit, where they were exposed to distinct environmental cues and children's spontaneous recall of the unique event was recorded. Subsequently, the children were asked questions requiring strategic recall (e.g., "Do you know what is inside the red box?"). In all of the three retention groups – regardless of age – children spontaneously recalled the events. This did not interact with age or delay. In contrast, older children reliably outperformed their younger peers on the questions requiring strategic recall. These results show that 3- and 4-years-old children are equally capable of spontaneously remembering a unique and distinctive event even after 3 months, whereas strategic retrieval was more difficult for the younger children. The results challenge a prevailing understanding of event memory development (e.g., Tulving, 2005) and suggest that: (1) Spontaneous retrieval has been overlooked in developmental research, (2) It is present early in development and (3) is less affected by age than strategic retrieval.

A11 Teams Channel

A12 Exploring the Social Origins of Young Children's Prosocial Attention

Nele Becker[1], Daniela Schmidt[1], Maleen Thiele[2], Daniel Haun[2], Christine Michel[1] and Robert Hepach[3]
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Infants and toddlers prefer to look at social interactions (Thiele et al., 2021) and show increased physiological arousal in response to seeing others needing help (Hepach, Vaish, & Tomasello, 2012; 2015). Here we aim to explore the interrelations of 10-months- to 24-months-olds' social and prosocial attention. Our goal is to shed light on what constitutes the origins of young children's prosociality by examining the degree to which children's prosocial attention (seeing others needing help and being helped) can be explained by their social attention (seeing others interact). We plan to investigate the underlying physiological mechanisms of toddlers' (pro)social attention in an eye tracking paradigm where we present participants with both social and prosocial interactions of two adults, as well as a control condition (in which the adults do not interact). All three conditions are illustrated within different scenarios, including rolling balls, building towers, and hanging up socks. The stimuli will be pseudo randomized and presented in blocks consisting of two tasks, a free viewing task (one single video at a time) and a preferential looking task (two videos presented simultaneously). Our approach echoes recent calls for methodological diversity as we include eye-tracking, pupillometry, body posture analyses, and facial electromyography (fEMG) to measure the underlying mechanisms of young children's prosociality. Based on simulated data analyses we aim to invite 100 to 150 children to have sufficient statistical power to detect small to medium effect sizes. We are aiming to collect data this year, starting in summer depending on prevailing COVID restrictions.

A12 Teams Channel

A13 The Development of the Affective Mechanism Underlying the Initiation of Joint Attention in Infancy and Its Consequences for Infants' Social Preference

Daniela Schmidt[1], Nele Becker[1], Maleen Thiele[2], Robert Hepach[3] and Christine Michel[1]

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During joint attention (JA), two individuals simultaneously attend to an object and are mutually aware of it (Csibra & Gergely, 2006). Adult research showed that the initiation of JA (IJA) is associated with the neurophysiological activation of the reward system (Schilbach et al., 2010). Studies on the early ontogeny of these affective processes are rare and have so far relied on video-coding of overt smiles (Venezia Parlade et al., 2009). In our planned study, we will use an innovative multi-method approach to investigate the development of positive affect during IJA in infancy and to examine its consequences for infants' subsequent social preference. We will conduct a gaze-contingent eye-tracking study with 4- and 10-month-olds comprising two phases. In the first phase, one avatar will follow infants' gaze direction (IJA condition) while another avatar will not follow infants' gaze direction (NOJA condition). In addition to coding overt smiles, infant affect will be measured by pupil dilation and facial electromyography (fEMG). Pupil dilation serves as an indicator for reward expectancy and physiological arousal (Hepach & Westermann, 2016), while fEMG can distinguish between different valences of affect through the detection of affective facial expressions that are too subtle to code from video (Cacioppo, Petty, Losch, & Kim, 1986). We expect 10- but not 4-month-olds to show more positive affect in IJA- than in NOJA situations. The second phase will focus on the consequences of the previously (un)successfully initiated triadic interaction for infants' social preference. The avatar who previously followed (JA avatar) and the one who did not follow the infants' gaze (NOJA avatar) will be presented both simultaneously and separately. If IJA is associated with reward, we would assume longer looking times to the IJA avatar and more positive affect when looking at the IJA avatar as compared to the NOJA avatar in 10-month-olds.

A13 Teams Channel

A14 The Influence of Parenting and Environmental Risk Factors on Low-Income Families' Response to COVID-19 Pandemic

Calpanaa Jegatheeswaran[1], Samantha Burns[1] and Michal Perlman[1]
[1]*University of Toronto*

Mother-child interactions can have bi-directional impacts across different domains child development – including social, emotional, and cognitive functioning – with stronger effects reported for at-risk families. Dysfunctional parenting (i.e., overprotection, hostility, low selfefficacy and low perceived parental impact) is associated with declines in mental health, poor emotional and behavioural regulation and reduced prosocial skills for children. Positive parenting practices in earlier childhood can instill social-emotional competencies and resilience within children. The COVID-19 pandemic provides an unfortunate, but unique opportunity to empirically study how prior parenting quality and environmental risk factors predict change in low-income families' mental health during the pandemic. In this study, data from 328 mothers, drawn from a larger longitudinal study conducted in partnership with the City of Toronto was used. To examine how familial mental health changed following the onset of the COVID-19 pandemic, latent profile analyses were conducted on the mental health scores of mothers and children. For mothers, the Patient Health Questionnaire, Generalized Anxiety Disorder, and Perceived Stress Scale were used. The following profiles emerged: Mothers with no change (66.15%), mothers with improved mental health (13.1%), and mothers with declines in mental health (19.2%). Mothers reported on their children's mental health using the Strengths and Difficulties Questionnaire (SDQ). Two profiles emerged based on children's SDQ scores: Children with no change or improved mental health (71.05%) and children with declining mental health (28.95%). Parenting practices were measured using the Parental Cognitions and Conduct Toward the Infant Scale. Lower rates of parental overprotection prior to the pandemic, were associated with improvements in both child and maternal mental health. Interestingly, lower prior parental self-efficacy was also associated with improvement in maternal mental health. Understanding the role that prior positive parenting plays in large-scale adversities will inform policy and public investments around parenting programs for economically disadvantaged families.

A14 Teams Channel

A15 Can 4-year-olds use verb-event structure to resolve lexical ambiguities?

Francesco Cabiddu[1], Lewis Bott[1], Gary Jones[2] and Chiara Gambi[1]
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While children rely on (top-down) verb-event structure over (bottom-up) lexical associations to generate expectations about upcoming words (Gambi et al., 2016), lexical associations appear to play a key role in children's lexical ambiguity resolution (Rabagliati et al., 2013). However, teasing apart the contribution of these two factors to lexical ambiguity resolution requires carefully controlled materials. For example, after hearing "Karl met the star" a child might interpret star as famous person (rather than astronomical object) because met co-occurs with that meaning in naturalistic speech, or because of its event structure (i.e., animate objects follow met) (Hahn et al., 2015). To test between these two hypotheses, we coded all verb instances used with 12 ambiguous nouns (6 polysemous, 6 homophones) in American and British CHILDES speech directed to children up to 4 years (N = 18,915; McWhinney, 2000). Following Rabagliati et al. (2013), 4-year-olds will hear a context (e.g., Charlie played the drums) biased toward a target word secondary meaning (e.g., music band for band), followed by a sentence where the target word follows a verb (i) lexically associated with the primary meaning (e.g., headband) but not the secondary meaning (Then, he got a band) or (ii) whose event structure is compatible only with the primary meaning (Then, he twisted a band). We will measure how likely children are to select the target primary meaning, using image grids displaying primary and secondary meaning, and two frequency-matched distractors. Importantly, in order to manipulate lexical associations and event structure independently, lexically-associated verbs were compatible with both meanings in terms of event structure and, conversely, event-structure verbs were not lexically-associated with either meaning (i.e., twist does not co-occur with band). Target choice proportions will be analysed using mixed-effects logistic modelling. Results will be discussed considering bottom-up and top-down accounts to early lexical ambiguity resolution.

A15 Teams Channel

A16 On the origin of quantification: infant's and adults' representation of the exhaustivity of collective and individual actions

Nicolo Cesana-Arlotti[1], Tyler Knowlton[2], Jeffrey Lidz[2] and Justin Halberda[1]
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Universal quantifiers are pervasive across languages, supporting generalizations over an infinite number of entities. Yet, it is unknown whether learning the terms for universal quantification is a prerequisite for representing the logical concepts. To shed light on the cognitive basis of universal quantification and its developmental origins, we study how adults and infants represent exhaustivity in visual scenes. We found that adults (N=36) spontaneously use "all" to describe movies of exhaustive-collective actions (e.g., all the agents chasing the same ball together), and use "each" to describe exhaustive-individual actions (e.g., each agent is chasing a ball individually). Furthermore, we found that the probability that a participant used "each" for individual-actions dropped when the number of agents surpassed the multiple object tracking limit (>4; Scholl 2001), while the probability of using "all" did not, even in scenes with 11 chasers. This finding, corroborated in a large-scale conceptual replication (N=270), suggests a cognitive signature of two distinct representations of exhaustivity in visual scenes: collective exhaustivity – a property of objects grouped in a visual ensemble – and individual exhaustivity – a property of individuals tracked independently. Next, in two habituation experiments, we presented 10-month-old infants (N=48) with the same types of movies. Infants who were habituated to the "All" movies with three chasers successfully dishabituated to the "Each" movies with three chasers, and vice versa. We are currently running a third experiment (N=28, data-collection in progress), in which infants are habituated to movies with five chevrons that exhaustively act together or individually. If infants attempt to quantify over the two types of 5-chevron events with computations similar to adults, we predict them to dishabituate only when habituated to collective actions. Such pattern of results will strongly suggest the presence of two forms of early quantificational capacities that predate the acquisition of natural language quantifiers.

A16 Teams Channel

A17 Infants look longer at urban scenes than scenes of nature, and chromatic and spatial scene statistics can account for their looking

Alice Skelton[1], Ailish MacInnes[1], Karyna Panda[1], John Maule[1], Jenny Bosten[1], Kim Meidenbauer[2], Cecilia Stenfors[3], Kathryn Schertz[2], Omid Karden[2], Marc Berman[2] and Anna Franklin[1]

[1]University of Sussex, [2]University of Chicago, [3]Stockholm University

Adults have a strong preference for natural over urban environments, and being in nature has attentional, cognitive, and health benefits. It is debated whether this preference is due to an innate evolutionary bias (biophilia) or learned during development. Meidenbauer et al (2019) found that between 4-11 years there is a gradual transition from an urban preference to one for nature. The current study investigates if children's initial urban preference can be traced back to visual preferences in infancy. While the adult visual system is optimised for natural scene statistics, little is known of infant sensitivity to the statistical regularities of complex scenes. Therefore, we also investigate if low level scene statistics predict infants' looking time. Infants (4-9 months, N=33) saw images of urban and nature scenes matched on adult ratings to have high or low aesthetic value. All possible image pairs were presented and looking time recorded. The study was run remotely using colour calibrated iPads, via Zoom. Infants looked significantly longer at urban than nature scenes. Image analysis quantified spatial and chromatic scene statistics of each image. Partial Least Squares Regression identified a model where a combination of scene statistics (e.g. saturation, hue contrast, and amplitude spectrum slope) explained large amounts of variation in infant looking. The urban visual preference in infancy suggests that adults liking of nature does not originate from an innate visual preference for nature. A further question is whether infants benefit from the attentional, cognitive, and health benefits of nature despite not displaying a preference for its visual characteristics. That spatial and chromatic scene statistics predict infant looking provides evidence that infants are sensitive to statistical regularities in the chromatic and spatial features of complex scenes. Further research now needs to establish how the visual system tunes into natural scene statistics during development.

A17 Teams Channel

A18 Young children's selectivity in teaching: Do toddlers and school age children prioritise the same type of information when they transmit information?

Didar Karadag[1], Marina Bazhydai[1] and Gert Westermann[1]
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Children effectively acquire information from their immediate environment in two main ways: learning through exploration, and learning from others. Research has suggested that children might reason differently about the information that they acquired through others' instruction compared to the information that they self-discovered. The aim of the current study is to investigate whether young children make a distinction between these two types of information when they themselves transmit information, and whether these preferences undergo a developmental change. In the proposed behavioural study, 2- and 5-year-old children will be presented with two novel boxes that will be perceptually identical except for the orientation of different-shaped buttons on top of the boxes and the functions associated with these buttons (i.e., a round button playing a tune on top-left side of the Box 1, a square button vibrating the box on the top-right side of the Box 2). In the Information Acquisition phase, children will be deliberately instructed how to operate one of the novel boxes in one trial and will have an opportunity to independently explore the other box in another trial. After children learn the functions associated with both boxes, they will be presented with a hybrid box combining the features of both Box 1 and Box 2. At this Information Transmission phase, children will be asked to demonstrate how this novel toy works to a naïve adult. We will code children's action demonstrations to uncover potential preference to socially transmit either the information that they learned through instruction or that they acquired through self-exploration. We aim to understand if children will show any preference for either type of information, and if they do so, whether this preference will differ between younger and older children who have been exposed to more pedagogical experiences in their daily lives.

T A18 Teams Channel

A19 Timing matters: The role of prior sleep for infant cognition

Sabine Seehagen[1] and Janika Pelz[1]
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Recent experiments have shown that post-encoding sleep facilitates a range of memory processes in infants, including consolidation, generalization, and gist extraction (Seehagen et al., 2019). However, the role of sleep prior to a learning opportunity has not systematically been studied yet, although sleep is widely assumed to prepare the human brain for information uptake (e.g., Yoo et al., 2007), and although infants sleep frequently. Hence, studying the role of prior sleep is important for understanding how infants use learning opportunities at different times in their sleep-wake cycle. By assessing different cognitive skills and applying different approaches to capturing the impact of prior sleep, the research presented in this talk was designed to start filling this gap. In Exp. 1, we tested 13- to 16-month-old infants' (N = 43) divergent thinking as a function of prior sleep. We found that divergent thinking did not vary as a function of nap status within the preceding 4 hours (containing a longer nap or no longer nap, respectively). However, divergent thinking varied as a function of prior nighttime sleep quality and quantity. In Exp. 2, we tested 6-month-old infants' (N = 17) visual recognition of emotional faces in a within-subject design where infants participated once shortly after waking up from a nap and once after having been awake for an extended period of time. Contrary to expectations, we found that recognition of faces showing negative emotions was enhanced after a period of wakefulness. In Exp. 3, we are currently testing 6-month-old infants' learning about unexpected events as a function of prior sleep. We predict that extended periods of prior wakefulness diminish infants' ability to recognize unexpected events as special opportunities for learning. Overall, the results suggest that relations between prior sleep and different cognitive abilities exist, and that they might be highly specific.

A19 Teams Channel

A20 The impact of community-based paediatric clinics on the developmental outcomes of children living in disadvantaged communities – a systematic review

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Children living in disadvantaged communities have substantially increased risk for deleterious health and development outcomes. Given the increased incidence of preventable developmental delay associated with social disadvantage, promotion of child health and well-being goes beyond the traditional medical-based setting and involve community-wide strategies that address the broader environments in which children live. Community paediatric clinics are well placed to adopt a multidisciplinary approach to early detection and prevention of developmental delay. They encompass health promotion services, counselling and advice, and referral to other health professionals. A number of studies outline the impacts of community paediatric clinics on the developmental outcomes of children living in disadvantage. However, to date systematic review of the evidence had not been carried out. This is the first study to use a systematic approach to retrieval, appraisal and synthesis of evidence on the topic. A carefully developed search strategy was used to select studies. Primary studies, quantitative, qualitative, and mixed-methods in nature were included. Study selection, search outputs, data extraction and quality appraisal were undertaken by two reviewers independently. Data analysis and mixed methods synthesis was guided by the Segregated Framework for Mixed Method Systematic Reviews.Of the 1968 studies identified, 49 abstracts were examined, 25 studies were reviewed in full and 18 studies were selected for inclusion. Four main themes emerged highlighting the impacts of community based paediatric clinics on child developmental outcomes; increased access to healthcare for disadvantaged children, earlier detection of developmental disorders, empowering parents and families through increasing knowledge of developmental delay, and increased collaborative working between paediatricians and community practitioners to support child health and development. Community-based paediatric clinics can better meet the healthcare needs of children, especially those who are vulnerable and at-risk. This review will inform paediatric health policy and practice to promote health equity and ameliorate developmental disadvantage.

A20 Teams Channel

A21 Parents & Caregivers experiences of having an infant born moderately or late preterm; a qualitative interview

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Background: Preterm birth (<37 weeks) adversely affects development in behavioural, cognitive and mental health domains. The transitional period into parenthood is also noted to be distinctly different for those who have had a child born preterm, characterised by heightened stress and anxiety. This divergent parental experience has been associated with both immediate consequences in the form of maternal attachment and subsequent long term infant development. Historically, research has focused on describing outcomes in children born very-preterm at the expense of more common late-preterm groups. This lack of representation is echoed in research exploring parental experience, with a paucity of documentation around the lived experience from those whose children were born at later gestations. Therefore, the current research aims to go beyond the use of singular standardised measures and gain a deeper understanding of what it means to be a parent or caregiver of an infant born moderately or late preterm. Methods & Data Analysis: Parents and caregivers of moderately or late preterm infants will be invited to participate in a single in-depth semi-structured interview. Thematic analysis will be used to synthesise content, with themes that arise across participants presented alongside detailed consideration of how this may impact our wider understanding of preterm infant development. This research is part of a wider mixed methods project and where appropriate, data from other aspects of the wider project will be presented alongside current results to draw further meaningful conclusions. Planned Outcomes: The proposed study aims to present a fully encompassing picture of parental perspectives following preterm birth. Qualitative research is a necessary addition for areas whereby behaviours and experiences are not fully understood. Documenting a more conclusive picture of this experience can lead to a comprehensive plan of support that will undoubtedly improve outcomes for both infants and their parents.

A21 Teams Channel

A22 Can Late Talkers Acquire a Shape Bias for Noun Generalisation?

Cecilia Zuniga-Montanez[1] and Andrea Krott[1]
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Late talkers show a vocabulary delay in the absence of any conditions or disorders that may account for this delay (Tsybina & Eriks-Brophy, 2007). Contrary to typically developing children, they also do not show a shape bias for noun generalisation, meaning they do not generalise object labels by shape (Jones, 2003). Instead, they generalise labels based on texture or do not have a preference at all (Jones, 2003). A lack of a shape bias has been suggested as one of the underlying reasons for late talkers' vocabulary delay. The current study assessed if late talkers can be taught a shape bias and whether this would accelerate their noun vocabulary growth. Fourteen late talkers between 24 and 47 months were randomly allocated to a shape training group or a control group. Following the procedure by Smith et al. (2002), we taught participants in the shape training group novel object labels (e.g. kiv) over seven weekly sessions, stressing that objects similar in shape had the same name. We introduced participants in the control group to seven sets of labels of existing objects (e.g. giraffe). In the subsequent two weeks, we assessed their noun generalisation strategy for taught and novel object labels. Participants in the shape training group generalised labels by shape (instead of colour or texture) for known object labels, but responded randomly when generalising novel labels. Participants in the word training group responded randomly for both types of labels. The two groups did not differ in terms of expressive or receptive noun vocabulary growth over the course of the study, measured by the Oxford CDI. Thus, in contrast to typically developing children (Smith et al., 2002), an explicit shape bias training did not help late talkers to pick up on this helpful word learning strategy and did not boost vocabulary growth.

A22 Teams Channel

A23 The Temporal Architecture of Neonatal Imitation

Timothy McGowan[1] and Jonathan Delafield-Butt[1]
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Neonatal imitation is of fundamental concern for understanding the nature of human communication, its evolution and development. Since the publication of Meltzoff and Moore's (1977) seminal paper, it has been discussed and debated at considerable length but the temporal structure within which imitation is claimed to occur has received limited attention. We propose that underlying successful examples of neonatal imitation exists a narrative temporal structure, consisting of phases of arousal and intensity that can be split into four distinct states: introduction, development, climax and resolution (Delafield-Butt & Trevarthen, 2015). This is common to human pre-verbal and verbal meaning-making, and is expressed and perceived not only through vocalisations but also through movement (Delafield-Butt & Trevarthen, 2015; Malloch, 1999; Malloch & Trevarthen, 2009). To test this, we will apply a computational analysis to the vocalisations and movements of both participants and experimenters in recordings taken from past studies of neonatal imitation. We will use audio analysis to consider the pitch, timbre, volume and general intensity of acoustic expression, and video-based tracking software using a form of deep learning (specifically convolutional neural networks) in order to predict and track the location of body parts. Another machine learning approach (for example a similarity learning based Siamese network architecture) will then be used to cluster data according to features corresponding to levels of intensity in the interaction. This clustering according to similarity will better enable us to understand if there is a common temporal structure underlying neonatal imitation, and if this common structure follows a narrative framework. The presence of a narrative structure will support the view that neonatal imitation is a dialogical phenomenon (Nagy, 2006) that forms one of the first examples of primary intersubjectivity (Kugiumutzakis & Trevarthen, 2015), exemplifying the importance of the neonatal period in human psychological and social development.

A23 Teams Channel

A24 The Effect of Parent Education on Parent Child Interaction and Motor Development

Andrea Baraldi Cunha[1], Iryna Babik[2] and Michele Lobo[1]
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Parent education to enhance early handling, positioning, and play experiences can improve future motor and cognitive outcomes for infants (Lobo & Galloway, 2008, 2012). This study aimed to determine whether parent education impacts parent child interaction (PCI) as well as motor development. Methods: Twenty infants (Mean=3.4, SD=1.3 months) were assessed twice at home, one month apart. After Visit 1, infants were randomly assigned to: 1) Milestone Education (Milestone, n=10), or 2) Activity Education (Activity, n=10). Parents received written information about expected milestones (Milestone) or about how to handle, position, and play with infants (Activity). PCI was assessed via behavioral coding of 40-60-minutes of naturalistic activity to identify: 1) infant's location (floor, held, container); 2) level of physical support from the parent (head, upper trunk, lower trunk, arm, none); and 3) presence of toys (within or out-of-reach, not present). Data were normalized to percentage of time. Motor development was assessed using the Alberta Infant Motor Scale (AIMS). Wilcoxon tests were performed for intra-group, Mann-Whitney for inter-group comparisons. Results: All infants spent less time held (z= -2.07; p= 0.038) less time supported by the head (z=-2.310;p= 0.021) more time supported by the upper trunk (z= -2.429, p= 0.015), and more time in the presence of a toy (z= -2.666;p=0.008) at Visit 2 relative to Visit 1. Activity infants had toys presented within reach more often (U= 19.00; z =-2.064;p=0.041) and showed greater improvement in motor development (U= 15.500;z=-2.399;p=0.016) as a result of the education. Conclusions: Process-focused may be favorable over product-focused developmental education to change PCI and children's motor outcomes. Parent education programs are broadly utilized. It is important to evaluate how to most effectively design the content of those programs to change PCI and optimize child outcomes. Education about daily activity performance may empower parents to shape developmental landscapes for their children.

A24 Teams Channel

A25 Infants use bowing as a cue to represent legitimate leadership

Francesco Margoni[1] and Lotte Thomsen[1]
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Research suggests that infants can distinguish between agents displaying fear-based social power (bullies) and agents displaying respect-based social power (leaders). However, it is unknown what cues infants can use to generate the representation of legitimate leadership. To find out, we started by asking whether the simple act of bowing (which matches the respect displays found across cultures, and it is similar to the prostration cues found across many species) suffices in generating the representation. Following prior work, we tested this hypothesis by assessing whether 21-month-olds expect a group of agents to obey to a main character if they have previously bowed for it. Infants watched computer-animated events involving geometric characters. In Experiment 1, infants were presented with familiarization trials where three agents bowed to a main character who responded with a hint of a bow. In test trials, the character instructed the agents to go to bed, and they either complied while the character watched but disobeyed after it left (disobedience) or continued to comply after it left (obedience). Infants looked reliably longer at disobedience than at obedience, indicating that 21-month-olds expect a group of agents to obey a character if they have previously bowed for it. In Experiment 2, infants were presented with the same events of Experiment 1 with the exception that in the familiarization trials the main character no longer responded to the bowing. Experiment 2 replicated the finding of Experiment 1. We are currently conducting a control experiment where infants are presented with the same events of Experiment 2 but the agents no longer bow to the lone character. We predict that infants will look about equally to disobedience and obedience, as no cues for leadership are provided. These findings suggest that humans can use bowing as a cue for legitimate leadership very early in life.

A25 Teams Channel

A26 Severity of Motor Delay and Timing of Reaching Mastery Achievement Determine the Effectiveness of the START-Play Intervention on Children's Reaching Outcomes

Iryna Babik[1], Andrea B. Cunha[2], Dongho Choi[3], Natalie Koziol[3], Regina Harbourne[4], Stacey Dusing[5], Sarah McCoy[6], James Bovaird[3] and Michele Lobo[2]
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The purpose of this study was to evaluate the effectiveness of the Sitting Together And Reaching To Play (START-Play)1 intervention for improving reaching abilities in children with motor delays. The study evaluated 112 children with motor delays enrolled at 7-16 months of corrected age. Blocked random assignment to BAU vs. START-Play intervention was based on severity of motor delay (62 BAU, 66 START-Play). START-Play consisted of twice-weekly intervention from a licensed physical therapist throughout the first 12 weeks of the study. All children were tested in a reaching assessment 5 times over the study course: at baseline and 1.5, 3, 6, and 12 months later. Behavioral coding of the recorded videos in Datavyu was used to evaluate frequency (normalized per minute) of the following behaviors: unimanual and bimanual contact, ventral contact, open-handed contact, looking at the object, looking while contacting the object, and number of bouts of behavior. Reaching mastery was marked at the visit when the child was reaching for at least 70% of the assessment time (0 = early mastery; first 3 visits; 1 = late mastery; 6 or 12 months post baseline). Multilevel statistical analyses evaluated the developmental trajectories of observed behaviors. For all outcome variables, children with significant motor delays who achieved mastery early showed a significant ($p < .05$) advantage as a result of the START-Play intervention over the duration of the study. No advantage of the START-Play intervention vs. BAU was found over the course of the study for children with mild motor delay or those who achieved reaching mastery late. The START-Play intervention effectively advanced reaching ability for children with significant but not mild motor delays. Since reaching is a prerequisite for object exploration, learning, and cognitive development,2-5 interventions focused on early advancement of reaching skills (like START-Play) should be considered by clinicians.

A26 Teams Channel

A27 The Habituation Project, Part I: Design Choices in Infant Habituation: A Crowd-Sourced Systematic Review and Meta-Analysis

Ingmar Visser[1], Šimon Kucharský[1], Martina Zaharieva[1], Tongyu Gu[1], Soobin Jo[1], Ines Luttenbacher[1], Lilli Mannsdörfer[1], Magda Matetovici[1], Urte Mickute[1], Janneke Staaks[1], Zoltan Torma[1] and Maartje Raijmakers[1]
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The habituation paradigm is one of the most prominent methods for studying infant cognition. Experimental designs and protocols, as well as reporting practices, vary greatly between the studies. These methodological variations and lack of consistency in reporting practices substantially hinder the interpretation and generalisability of the outcomes from habituation studies. With the hope of devising a set of specific reporting guidelines for habituation studies and weighing the impact of otherwise potentially arbitrary methodological design choices, the present study addresses two primary goals. First, we map out experimental design choices used in habituation studies, including the habituation detection rule. In a follow-up meta-analysis, we assess the relationship between these design choices and the resulting effect sizes while controlling for covariates such as age. Following the PRISMA reporting guidelines, we perform a systematic review of the design choices and post-habituation measures used in habituation study samples aged 0-18 months, with a focus on the visual response modality literature (i.e., habituation experiments with looking time as the dependent variable). A total of 2,853 papers published in peer-reviewed journals between 2000-2019 were extracted from PsycInfo and Web of Science and screened by 6 raters (inter-rater reliability Fleiss kappa between 95% CI [0.4 - 0.8]), yielding 785 (27.5%) papers for results extraction. We welcome researchers from various developmental research backgrounds to join our team as raters in a large-scale collaborative effort.

A27 Teams Channel

A28 Gaze following during virtual social interactions

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From 10 months of age, human infants start to understand the function of the eyes in the looking behaviour of others. In fact, they look more often at a target object when the experimenter turns towards it with open rather than closed eyes (Brooks & Meltzoff, 2002; 2005). Thus far, gaze following skills have been investigated in strictly controlled laboratory paradigms. In reality, social interactions take place in less controlled situations. Moreover, as a result of the Covid-19 pandemic, interactions increasingly happen virtually and as a result, children's screen time has increased substantially (Hartshorne et al., 2020). The current study investigates early gaze following ability using a remote live testing procedure, whilst manipulating whether the experimenter can or cannot see the targets. Given that the home environment cannot be standardised as the laboratory, we aim to understand whether previous findings generalise to a virtual partner and to a more naturalistic setup. Sixteen 11- to 12-month-old infants are tested for each eye status condition in a between-subject design (Seeing vs. Blind experimenter). The study takes place remotely using a synchronous testing procedure. We measure infants' looking behaviour in response to an experimenter who silently turns towards a predetermined target on screen and we compare their first look across the experimenter's eye status conditions. We also explore if looking behaviour is linked with previous exposure to video calls. Preliminary survey data (N=18) showed that 83% of infants have been exposed to virtual interactions, 80% of them were exposed at least once a week. This project is currently ongoing and final data will be presented at the conference. These results will be key to testing whether and how past findings generalise to different environments and to understand whether infants treat real and virtual gaze cues in similar ways.

A28 Teams Channel

A29 Does looking preference towards specific areas of the face explain later language development? An exploratory study in Italian infants

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The articulatory information coming from an adult's talking mouth and the social meaning expressed by their eyes play an important role in the child's linguistic and communicative development. Recent studies have reported a significant relationship between the time a child spent looking towards the adult's mouth and the child's linguistic skills tested through questionnaires both at the time of the experiment (Morin-Lessard et al., 2019, Tsang et al., 2018) and some months later (Tenenbaum et al., 2015). No studies have so far investigated such relationships by testing children's language in a naturalistic context. The aim of the present contribution is to test whether the child's looking preference towards the mouth or the eyes a) is related to his/her current level of development and b) can predict later language production in a naturalistic context. The eye movements of 26 Italian children (M= 294 days; SD= 81.3) were tracked while listening to a story tallied in their native language using EyeLink1000; their language skills were observed at the same time of the experiment (T1) and three months later (T2). The children's spontaneous vocal production during 20 minutes of interaction with their mother was transcribed and coded using three categories: preverbal forms, babbling, and words. Their expressive and receptive vocabularies were also assessed using the Italian version of the MB-CDI (Caselli et al., 2015) at T2. At both T1 and T2, the children who preferentially looked towards the month displayed lower levels of babbling and words than those who preferred to look toward the eyes. A significant and positive relationship has emerged between looking time to the mouth and expressive vocabulary at T2 (Spearman's rho = .461, p = .018). These preliminary results suggest that mouth-looking is related to children's vocabulary development. Further studies, with larger groups, are needed to confirm and generalise these results.

A29 Teams Channel

A30 Casual Training: The Effect of Motor Observations

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Research from multiple areas such as sports, physical therapy, and kinesiology suggests that motor skills are highly respondent to training, therapy, and intervention. However, the effectiveness of parent-guided training during infancy has recently been called into question. Van den Berg and Gredeback (2020) conclude that training grasping behaviors in three-month-old infants may not result facilitate grasping development. The current study aims to provide additional evidence supporting the notion that parent-guided motor experiences can indeed shape infant motor development. Further, the study will examine whether early motor experiences can cascade and influence subsequent language development. Two groups of mother-infant dyads will be compared (target N = 44). Half of all participants will complete longitudinal in-home observations between 3- and 6 months of age, whereas the other half of participants will only complete one observation at 6 months of age. We hypothesize that asking parents to engage in reaching and sitting activities for just 1 minute each week will impact infants' motor development. Motor skills will be assessed at 6 and 10 months via the parent-report Early Motor Questionnaire (EMQ, Libertus & Landa, 2013). Language skills will be assessed via the parent-report MCDI at 10 months of age. Differences in motor development between the home observation (i.e., "trained") group and the comparison group at 6 months of age will support the notion that motor development can be facilitated by brief, parent-guided interventions in the family home.

T|¦ A30 Teams Channel

A31 The effect of speaker's eye gaze on infants' cortical tracking of speech and word recognition

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In child-caregiver interactions, eye gaze is a powerful social cue that facilitates children's learning in various domains of cognitive development, including language development. The ability to establish eye contact with a communication partner and follow their gaze allows infants to orient and attend to the relevant information in the naturally noisy environment. As a result, measures of early gaze-following and responses to joint attention correlate positively with receptive and expressive vocabulary (Brooks & Meltzoff, 2008). However, the effects of eye gaze on other aspects of language development is less clear. This is an important omission given the potential role of eye gaze as an ostensive cue that optimizes information transfer between the child and the adult (Csibra & Gergely, 2009). Eye gaze might have a general enhancement effect, also facilitating learning in different aspects of language, such as speech perception and word segmentation. In the current study, we investigated infants' cortical tracking of continuous speech and word segmentation in ostensive and non-ostensive conditions. 10-month-old infants watched videos of an adult Dutch speaker telling stories, addressing the infant either with direct or averted eye gaze, while EEG was recorded. In these audio-visual stories, one word was repeated in every sentence. Each video was followed by audio-only isolated words (familiar/novel), to test for an ERP word familiarity effect. We aimed to determine if infants' cortical tracking of speech, measured by speech-brain coherence, was associated with word recognition performance, and whether the ostensiveness of the adult's speech, signaled by their eye gaze direction (direct vs. averted) facilitated infants' neural processing of speech and word recognition. Preliminary results will be presented at the conference.

A31 Teams Channel

A32 Understanding infant speech perception: The role of speaker variability and speaker familiarity in phoneme acquisition – A systematic review and meta-analysis

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Phoneme acquisition comes with challenges, as infants are faced with enormous acoustic variability and lack of invariant features corresponding to phonemes across speakers. Nevertheless, infants acquire the phoneme inventory of their native language(s) within the first year of life through mere exposure to their native language. This implies that infants already have a mechanism in place to deal with speaker variability. To understand how this mechanism might function, we will investigate how voice information, used to distinguish speakers, influences speech perception. Previous studies have reported two different ways of how voice information influences speech perception in infants and adults: The variability benefit holds that phonemes are learned better when the training has a higher degree of speaker variability, while the familiarity benefit holds that recognizing phonemes is easier when they are uttered by familiar speakers. Thus, the familiarity and the variability benefit seem to contradict each other: Listeners learn better when there is more voice variability in the signal, but also seem to benefit from familiar voices. We here propose that these mechanisms might in fact be compatible: Speaker variability may aid category formation during phoneme acquisition, whereas speaker familiarity may rather improve online acoustic processing of phonemes. We will test this proposal in a systematic review and meta-analysis and explore whether studies confirm that variability in the signal helps phoneme generalization, whereas familiarity supports phoneme recall. Moreover, we will evaluate whether these benefits change over the life span, reviewing findings in infants, children, and adults. Our study will thus provide insight into how voice and speech information are integrated to aid phoneme acquisition in infancy, and to enable effortless speech perception in the face of speaker variability in adulthood.

A32 Teams Channel

A33 Maternal Depression and Sensitivity Modulate the Timing of Mother-Child Dialogue

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The temporal coordination of conversational exchanges in mother-child interaction lays the foundation for developing language skills. Our previous work (Smith & McMurray, 2018) demonstrated developmental effects on the timing of maternal responses, with mothers responding with shorter and less variable latencies to older children. The present study extends this work by exploring how maternal sensitivity and depression are related to temporal characteristics of dialogue between 100 mother-child dyads at 14 and 36 months of age. All families were enrolled in the Early Head Start Research and Evaluation Program (EHSREP), an intervention targeting lowSES at risk families. Maternal response latencies (the interval between the offset of a child's utterance and the onset of the mother's contingent response) were manually extracted from the audio recording (using Praat), and examined using linear mixed effect models (with lme4), with fixed effects of child age, maternal depression and maternal sensitivity. We observed significant effects of age, sensitivity, and depression on maternal latency. The latency of responses to children was shorter for older children and for mothers with high levels of sensitivity, but longer when mothers had higher levels of depression. Significant interactions of age × sensitivity, as well as sensitivity × depression, suggest that the influence of sensitivity on maternal response timing is greatest for mothers of younger children, and mothers with greater depressive symptoms. We will discuss these findings using the family stress model framework (Conger & Elder, 1994), and the possible connection between sensitivity and depression in mother-child interaction.

A33 Teams Channel

A34 Emblematic and interactive uses of young children's shrug gestures

Natalie Dowling[1], Marisa Casillas[1] and Susan Goldin-Meadow[1]
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American English-speaking adults use shrugging gestures (e.g., shoulder shrugs, "palm-ups", head tilts) to navigate interaction with remarkable flexibility. Although shrugs are some of the earliest gestures children produce, often even before first words, few studies have yet examined how children use them interactively. Shrugging gestures are more than an ignorance emblem; shrugs can negotiate turn, metaphorically "hold" topics, and take stance (see Cooperrider et al, 2018 for review). Because young children use shrugs to express a limited range of meanings (Beaupoil-Hourdel & Debras, 2017), we can gain insight into both the development of conversational stance-taking and the ontology of interactive gesture from initial, "kernel" meanings by investigating how children's shrugs shift from limited, emblematic uses to complex, interactive uses over the first years of life. The present study uses a conversation analysis inspired annotation scheme to examine young children's shrug gestures in a longitudinal dataset of video-recorded parent-child interaction for 18 American English-learning children (12 home visits between ages 1;2 and 4;10). Transcribed videos were coded for shrug form (i.e., those with and without a canonical shoulder raise or palm rotation), gesture-speech relation, and communicative intent (i.e., objective intent communicating knowledge state vs subjective intent communicating (dis)interest and (dis)agreement). We begin with three hypotheses: 1) Shrugs more canonical in form are more easily recognized as emblems and may be closer to a kernel meaning. 2) Since shrugs substituting for speech are necessarily emblematic, they may be produced with more canonical forms and take a narrower range of meanings than shrugs co-produced with speech. 3) If early shrugs are closer to a kernel meaning, children may primarily use shrugs with objective intent, expressing an absence of knowledge and an openness to new information. Coding and analysis are ongoing; we will present preliminary results for each of the three hypotheses listed.

A34 Teams Channel

A35 The relationship between ASL sign duration and iconicity in child-directed signing

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Iconicity, the relationship between form and meaning of words in a language (Thompson et al., 2012), is present in both spoken and signed languages (Caselli & Pyers, 2017; Fuks, 2020; Perniss et al., 2010). Recent evidence suggests a positive relationship between iconicity and age of acquisition in deaf children's early sign lexicons: the vocabularies of signing children show high levels of iconicity (Caselli & Pyers, 2017; Meier et al., 2008), and signing toddlers produce iconic signs more often than non-iconic signs (Perry et al., 2018; Thompson et al., 2012). In the current study, we investigate parental American Sign Language (ASL) input and child productions to analyze the relationship between sign iconicity and duration in child-directed signing, and how that relationship is mediated by a child's age and visual attention. We used a corpus of interactions (n = 24) between parents and deaf children ages 9 to 60 months, containing over 4,700 sign tokens. We analyzed child and parent sign lexicons using the ASL-LEX database (Caselli et al., 2017). Consistent with earlier findings, we find that children produce signs that are, on average, more iconic than is typical of the adult lexicon (as measured by the ASL-LEX database). When analyzing all parent sign tokens, iconicity is a significant predictor of sign duration (Beta = -0.035, SE = 0.0136, t= -2.631), suggesting that parents may elongate iconic signs. However, this relationship may be at least partially driven by pointing, which function as pronouns in ASL. But how many of these iconic signs are actually perceived by the children? Our ongoing analysis probes whether children's eye gaze influences parents' sign duration, and if that influence privileges more iconic signs. Our findings will shed light on the potential mechanisms that drive the prevalence of iconicity in children's early sign lexicons.

A35 Teams Channel

A36 Proactive interference disrupts 3-year-old toddlers' visual working memory

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Proactive interference (PI) occurs when previous, currently irrelevant memories intrude during retrieval (Keppel & Underwood, 1962; Kane & Engle, 2000). Despite the central role of interference in adult cognitive (Oberauer et al., 2018) and neuroscientific (Jonides & Nee, 2006) models of working memory, little work has been done on PI in young children. Our preregistered study (https://osf.io/3eg6h) used Delayed Match Retrieval (Kaldy, Guillory & Blaser, 2016), an infant-friendly adaptation of the popular game Memory (or Concentration), here adapted to a touchscreen tablet, to investigate the effect of PI on visual working memory in 3-year-old typically developing children (N = 36, M = 34.8 +/- 3.5 months). We presented two blocked conditions (counterbalanced), with 8 trials each: (1) PI: the same set of objects were used in every trial, and (2) No_PI: a new set of objects was used in every trial. Overall performance was significantly higher in the No_PI (M = 76.6 +/- 15.8%) than in the PI condition (M = 62.8 +/- 16.0%) indicating that 3-year-old children are highly sensitive to the effect of interference from previous trials (paired t-test, t(35) = 5.231, p < 0.00001). We analyzed trial-by-trial trends with a nonlinear regression. Results from the two conditions produced significantly different functions (F(3, 508) = 4.50, p = 0.004), with the following asymptotes: No_PI = 71.1%, PI = 47%, with PI reducing toddlers' performance to chance level by the fifth trial. The resolution of interference in working memory is a crucial cognitive control skill and here we provide the earliest estimate of its influence. The flexibility of our tablet paradigm allows for future studies to track this trajectory across a wide age range. Methodologically, our findings provide evidence that paradigms that reuse items across trials may vastly underestimate young children's working memory capacity.

A36 Teams Channel

A37 Exploring ABR-EEG feasibility steps in a newborns' brainstem development study on music

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Studies on how music exposure is beneficial for the brain have driven the scientific interest to focus on earlier stages of development and more specifically on infants. In this context, when exploring the perinatal therapeutic, restorative and developmental potential of music and complex sounds only a small number of studies have successfully managed to discuss early neurophysiological evidence. These studies have mostly shown an interest on cortical activation, (i.e., employing either amplitude integrated electroencephalography (aEEG), magnetoencephalography (MEG) or Event-Related Potentials (ERPs)) while a few of them have also explored the neuroplastic effects of music on the brainstem; mainly focusing on 3 y/o children and above. In fact, there is no study exploring newborns' perception of music, employing neurophysiological measurements on the brainstem. Our study, trying to fill this gap, follows a randomized control trial (RCT) approach to measure neurophysiological perception of music versus language on the brainstem (auditory brainstem response - ABR) of at least 120 healthy full-term newborns (APGAR score 8 and above) in the first 10 days postpartum. However, before moving on with the main data collection process, we embarked on checking the study's feasibility, trying to answer the question: Can it work? The main objectives of our feasibility study include the assessment of recruitment capability and resulting sample characteristics, data collection procedures and outcome measures, acceptability of the intervention's procedures and resources, as well as the ability to manage and implement the study and intervention. For each objective, we answered follow-up questions based on a previously published health-interventions theoretical framework, designed to assess feasibility, and ultimately assist in understanding the barriers towards a study's success. Our presentation, focusing on the first 15 newborns recruited, discusses elements related to the auditory brainstem response (ABR) protocol implementation, data collection and analysis, considering the specific hospital (i.e., Middle East) and highly sensitive timeframe settings (i.e., 24 hours neonates). It brings to the fore technical difficulties and subsequent considerations towards improvements regarding the ABR implementation resources and steps, and critically approaches the positive trend of results this limited sample showcased.

A37 Teams Channel

A38 Understanding Collaborative Skills in Children with Autism

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Autism Spectrum Disorder (ASD) can impact a child's ability to communicate and collaborate with their peers in order to establish and maintain relationships. The 1 in 66 children in Canada with ASD require targeted interventions to enhance communication and collaboration skills (Autism Speaks Canada, 2020). Collaboration can be defined as the ability to combine resources in order to solve a problem or perform a task using interactions that enhance learning and knowledge (Evans, 2020). Collaborative skills have been described as one of the top marketable abilities in the 21st century's rapidly changing labor force (Evans, 2020). Given that early childhood is a critical developmental period, collaboration should be incorporated and promoted in early childhood education and care (ECEC) settings that serve children between the ages of 0 to 6 (Barnett & Nores, 2012). Early interventions have shown to improve a myriad of developmental domains in children with ASD (Evans, 2020), however, to date, there is little consensus about how to operationalize or improve collaboration skills in this population (Evans, 2020). Using a comprehensive integration scoping review methodology this study integrates existing empirical literature on collaboration in early childhood of children with ASD. Preliminary findings suggest that there are various approaches to measuring collaboration in children with ASD such as children's cognitive state during collaboration, children's ability to use collaborative language and children's ability to jointly pay attention to a task. In addition, some examples of factors that influence a child with ASD's collaborative skills are the mode of collaboration (i.e., verbal or nonverbal), number of tasks performed simultaneously, and length of the interactions. This study contributes to educational policy, future research, and educational interventionists in developing collaborative interventions for children with ASD.

A38 Teams Channel

A39 Interactions between sleep and gut bacteria in healthy developing infants

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The maturation of different physiological processes drives healthy infant development. Two critical maturation processes are the evolution of sleep rhythm and the growth of a complex ecosystem of gut bacteria. However, no study has investigated whether the maturational process of sleep interacts with gut bacterial growth and whether this potential link relates to healthy behavioral development. We quantified habitual sleep (actigraphy-derived Sleep Day, Sleep Night, Sleep Timing, Sleep Variability, and Sleep Activity), gut bacteria markers (16S rRNA gene profiling for computing bacterial diversity, enterotype, and bacterial maturation index), and behavioral development (Ages and Stages Questionnaire) in 162 infants at 3, 6 and 12 months of age. With multilevel and regression models, we analyzed links between habitual sleep and gut bacteria and random intercept cross-lagged panel models for the analysis of interactions with behavioral developmental outcomes. We found evidence of a sleep-gut link: daytime sleep (Sleep Day) was negatively linked to gut bacteria diversity (p = 0.02), and nighttime sleep fragmentation (Sleep Activity) was positively linked to bacterial maturation index (p = 0.03) and enterotype (p = 0.048). Sleep Variability was linked to enterotype patterns (p = 0.02). Furthermore, we found associations between both gut bacteria and habitual sleep and behavioral development both at the same age and predictive for later ages. General patterns revealed that habitual sleep was associated more strongly with personal-social development, with daytime sleep showing most associations. Gut bacteria were associated mainly with gross motor development, with bacterial diversity showing most associations. We find novel evidence for a sleep-gut link in infants that is relevant for behavioral development. This research provides the targets of sleep or gut bacteria as fundamental anchors for non-invasive modification to promote healthy development. Considering that many adult diseases root in early childhood, early interventions can improve lifelong health.

A39 Teams Channel

A40 Infant language during everyday activities in the home environment
Nicole Pinheiro Mehta[1], Catalina Suarez-Rivera[2], Mackenzie Swirbul[1], Catherine Tamis-LeMonda[1] and Alexandra Mendelsohn[1]
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Infants are exposed to language during predictable, daily routines such as feeding and dressing. Notably, the contextual cues and context-specific nature of language input support infant language learning. Is infants' early word production also characterized by specificity across unique routines (e.g., saying nouns such as "water" during feeding, and "book" during book-sharing)? We addressed this question by observing Latine toddlers during naturalistic home activities to broaden understanding of language development to diverse samples. What words do Latine children produce at home? Are word types specific to routines or do they repeat across routines? Fifty Latina mothers and their 1-to-2-year-olds (66% males) were video recorded for 1-2 hours during everyday routines at home. Infant language was transcribed in Datavyu. Routines of grooming, object play, literacy, media, feeding, chores, and unstructured were coded using a 30-second time-sampling interval coding system (N=20 coded thus far). Infants spent most time in object play (M=40%, SD=9%), followed by unstructured (M=25%, SD=11%), feeding (M=15%, SD=8%), media (M=11%, SD=11%), literacy (M=5%, SD=5%), grooming (M=2%, SD=2%) and chores (M=1%, SD=1). Infants produced 240 utterances on average (Range=54-547) and averaged 19.25 unique word types (SD=17.22, Mdn=17.50, Range= 0-70). Infants' words were largely conversational expressions though other lexical categories occured (Table 1). As expected, infants produced most word types (71%) during a single routine, suggesting correspondence between infant word types and activities. Further analyses revealed infants produced those unique word types exclusively even during "rare" routines such as media, grooming, and feeding. Our preliminary results suggest that infant early word production is characterized by specificity across unique routines. Through ongoing coding (i.e., lexical and semantic categories of word-types) we will uncover mechanisms through which daily routines set the stage for infant language production; we will investigate why do specific words overlap with some routines not others.

A40 Teams Channel

A41 Relation of Maternal Sensitivity to Infants' Responsiveness to Joint Attention Cues

Yueyan Tang[1], Betina Karshaleva[1] and Gedeon Deák[1]
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Past research indicates that maternal sensitivity has an effect on social communication skills, infants' attachment styles, and more complex cognitive processes (Biro et al., 2015). Recent studies suggest that infants' responsiveness to joint attention cues is an important predictor of successful social interaction and plays a key role in the acquisition of social cognition skills during the early years of life (Deák, 2015). This study aims to assess the relation of maternal sensitivity to infants' responsiveness to joint attention cues among 42 dyads recruited from the San Diego area for a longitudinal study. In-home toy play sessions were recorded monthly. Mothers were instructed to give infants attention-directing cues during an unscripting period following the play session. We quantify mothers' sensitivity by analyzing their responsiveness to infants' needs and emotions (Mesman & Emmen, 2013). We operationalize maternal sensitivity as specific indices of maternal adaptation to, or interference with, ongoing infants' behavior. We code the infants' responsiveness to maternal actions by quantifying the accuracy and timing of infants' responses to maternal cues and bids, including maternal gaze cues, and pointing gestures. To quantify how the results are related to individual differences in infants' social tendencies, we compare the results to analyses of the same babies responses to gaze- and point-cues by trained researchers in the lab during a standardized attention-following task, and to Early Social Attention Scale scores collected at 22 months. The results would supplement findings in previous studies that high maternal sensitivity correlates with high levels of infant interpersonal engagement (Hobson et al., 2004). This project can pave the way for further research focusing on the social communication skills of infants with atypical development.

A41 Teams Channel

A42 Differences in acoustic and lexical items across dialects of English infant-directed speech

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North American English-learning infants have higher vocabulary scores than British infants (Hamilton et al., 2000) and are more likely to detect individual words in sentences in a word segmentation task (Floccia et al., 2016). Yet, it is unclear why this asymmetry exists. Perhaps the linguistic composition of a specific dialect differs in how infant-directed speech (IDS) is manifested. That is, does the use of specific characteristics (acoustic, lexical) in IDS differ across dialects of English? Mothers with 18- to 24-month-old infants were recorded while reading 6 stories: 3 familiar creatures (e.g., monkey) and 3 novel creatures (e.g., nembee). Each story featured a target creature in 2 initial, 2 medial, and 2 final sentence positions. Recordings were analysed for vowel pitch (Hz) and duration (ms) and lexical carrier items. Canadian (n=5) and British mothers (n=5) were matched for infants' age, gender, and mothers' education. Due to the COVID-19 pandemic, the Canadian data collection was suspended until recently. We have resumed our data collection using remote methods, i.e., video conferencing and sending recording devices to families. We measured stressed vowels for each target creature embedded in a sentence. Preliminary independent t-tests were conducted. The current findings show that British mothers produce a wider pitch range than Canadian mothers in initial position ($p < .05$), but no difference between medial or final position, nor mean pitch or duration overall. Regarding lexical items, our non-significant results show that Canadian mothers produced higher counts of complete and partial repetition in CDS, onomatopoeia, isolation, and diminutives than British mothers found in spontaneous speech (see Table 1). We predict that English-speaking mothers will demonstrate differences across dialects in different ways. It may be the case that mothers' dialects may use dissimilar strategies when speaking to their children.

A42 Teams Channel

A43 An Examination of the Differences Between Gesture and Vocalization in Early Conventional Communication

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Some research indicates that gestures appear before talking and correlate strongly with language development (Iverson & Goldin-Meadow, 2005). Conventional gesture is the most widely used term to classify what we consider to be nonverbal behaviour, or gesture (Epstein & Raffi, 2018). When we learn to speak and adopt the symbolic system of our language, we do so by coming to understand how and when to use symbolic acts. Previous findings suggest that both conventional gesture and conventional vocalization (e.g., words/protowords) may be rare even in at the end of the first year (Burkhardt-Reed et al., under review). This recent work found that conventional vocalization occurred more often than conventional gesture; however, these instances were overwhelmingly performative rather than semantic acts of reference. This finding is in stark contrast to the literature's focus on gesture in the development of language where infants are viewed as extensively using conventional gestures. The overall goal of this research is to identify the rates of conventional gesture compared to conventional vocalization to determine if gesture is overwhelmingly the means by which children first use symbols. Seventy-two 20-minute segments featuring social and non-social sessions (with parent vocal interaction and while overhearing adult-to-adult talk) were selected from lab recordings of 12 infants at ages 14 months, 16 months, and 18 months. One coder and one reliability coder will participate in this study. This project is currently in progress, but it will be completed by the time of presentation. We hypothesize that the results will show a similar predominance of conventional vocalization over conventional gesture in the second year. However, we do anticipate an increase in the overall number of conventional acts in both modalities. The preliminary results suggest that infants are continuing to produce more conventional vocalizations than conventional gestures in the second year. The proposed data analysis is mixed model regression.

A43 Teams Channel

A44 Social and perceptual salience go together in one-year-old joint play

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Interactive and real time studies of how word reference is established have contributed to the view of language as a multimodal process spanning different timescales, tuned to infants skills and social interactions. Analysis of bottom-up visual properties in the context of naming show first-person images are generally unambiguous with respect to the object being referenced. Third-person view analyses of child-adult play suggest that word reference is constructed through joint action. By jointly attending to and acting upon objects, pragmatic narratives are created through which the identity of word reference is solved. The use of head-mounted eye trackers enables the study of these two proposals in a common framework. Here we show adults do talk about objects being acted upon but also that objects jointly attended to and acted upon are visually salient. Socially pragmatic and perceptual cues cannot be thought as independent pathways and collaborate in establishing object reference at ages when infants are developing their abilities to select and sustain their attention.

A44 Teams Channel

A45 Assessing neural sensitivity for mother's face in 5-month old preterm and term infants with fast periodic visual stimulation

Steffie Amelynck[1], Lyssa de Vries[1], Melinda Schaap[1], Sofie Vettori[1], Bieke Bollen[2], Guy Bosmans[1], Jean Steyaert[1], Bruno Rossion[3], Els Ortibus[1], Gunnar Naulaers[2] and Bart Boets[1]

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Infants communicate with others by 'reading' faces. They discriminate familiar from unfamiliar faces, and derive information about their feelings and intentions. Preterm infants are at risk for socio-emotional difficulties and an increased prevalence of ASD. Therefore, detailed monitoring of early socio-emotional development in this high-risk population 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 frequency-tagging EEG to assess the neural sensitivity for detecting a familiar face among unfamiliar faces. This approach is reliable, robust, and allows obtaining data without complex analyses. The basic principle of this approach is that the brain responds at exactly the same periodicity as the frequency of visual stimulation. Based on this principle, an oddball familiar face discrimination paradigm was administered to a group of adults, a group of 5-month old preterm infants, and a group of 5-month old term infants. We present a stream of different unknown faces, all within their natural background, at a base frequency of 3 Hz. In between these faces, every third face, thus at 1 Hz oddball rate, is an image of a familiar person (for the infants the face of their mother). All these images of the mother differed largely in terms of viewpoint, background, etc. The EEG-amplitude at the oddball frequency reflects the sensitivity for recognizing the familiar face at a single glance. A selective oddball response is observed in almost every individual participant, situated along occipitotemporal regions. We expect adults and term infants to be able to detect the familiar face better than preterm infants. In the future, we will use retrospective analysis to compare typically developing infants to infants who develop autism and socio-emotional difficulties. We expect differences in attachment styles may also modulate their performance and sensitivity.

A45 Teams Channel

A46 The Classification Accuracy of a Novel Dynamic Assessment of Word-Learning for Two-Year-Old Late Talkers

Victoria Singer[1], Lynda Kennedy[1] and Juliana Gerard[1]
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Based on expressive vocabulary size, up to 20% of 2-year-olds are late to talk (Zubrick et al., 2007). The majority have good word-learning potential and will catch up to their peers over the pre-school period. However, approximately 25% will have persisting difficulties and are at risk for a clinical diagnosis of Developmental Language Disorder (Paul & Ellis Weismer, 2013). A dynamic assessment (DA) which explores how children learn words and the likelihood of imminent improvement may assist with more reliable classification of those at greatest risk for persisting language difficulties. Fifty-one children aged 24-months (24 typically developing (TD) and 27 with expressive vocabularies at or below the 25th percentile and 'at risk') were administered a new DA of novel word-learning as part of a battery of standardised assessment. Teaching supports (cues) were delivered cumulatively over three levels with testing for novel word retention following the provision of each cue. Retention testing was followed by probing for transfer of understanding and both independent and imitated production of each word. Discriminant function analysis revealed that DA mediation scores, a composite of novel word retention, transfer, and production, differentiated TD and 'at risk' children with 82.4% classification accuracy (85.2% sensitivity and 79.2% specificity). Adding ASQ-3 personal-social scores increased specificity but reduced sensitivity. Receiver operating characteristic analyses were used to identify usable clinical cut-off scores. A new play-based DA which took approximately 20-minutes to administer successfully classified TD and 'at risk' toddlers on word-learning ability. DA mediation scores showed potential as a useful tool in clinical decision-making. Further longitudinal research is required to determine how the DA might predict 'at risk' trajectories over the 2- to 4-year period, and the outcomes of any treatment decisions made of the basis of mediation scores.

A46 Teams Channel

A47 Shining light on the links between sleep and visual working memory in infancy

Samuel Forbes[1], Jordan McCarthy[1], Jeevun Grewal[2] and John Spencer[1]
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Sleep is the dominant state in infancy, taking up over half of the average infant's time. Some theories suggest that sleep is a period of consolidating learning, with both sleep spindles and slow wave sleep implicated in learning and memory functions. In later childhood, even small deficits in sleep were found to have detrimental effects on school performance, memory and executive functioning. Sleep is developmentally important and known to affect working memory, but understanding how this link develops across the changing patterns of early sleep and across different environments is key to understanding the mechanisms by which sleep affects working memory and wider cognitive abilities. Participants were recruited from two settings: Norfolk, UK, and Uttar Pradesh, India. The UK and India are important comparisons due to the differences in household dynamics and sleeping conditions, as well as socio-economic factors known to affect sleep. Participants took part in a task that assessed their visual working memory using both behavioural data collected through eye-tracking, and optical neuroimaging collected through fNIRS. Results demonstrated that despite considerable variability in sleep measures across the two samples, sleep performance was an important contributor to visual working memory performance. Functional activation during the visual working memory task provided further insight into the mechanisms behind the link between sleep and working memory. The role of sleep in development, both within and between cultures will be discussed in detail.

A47 Teams Channel

A48 The role of labels in infants' category learning: phonological vs. visual similarity

Nadja Althaus[1]

[1]*University of East Anglia*

Labels play an important role in infants' categorisation, allowing infants to divide visual stimulus sets that are grouped together in silence (Althaus & Westermann, 2016; Havy & Waxman, 2016). However, the precise roles of phonological and visual similarity remain unclear. One hypothesis is that only dissimilar labels allow dividing of stimuli. But it is also possible that with sufficient visual dissimilarity the category boundary could be detected even for similar labels. To investigate the interaction between phonological and visual similarity, we familiarised 17-month-old infants with two sets of eight novel objects and two novel labels in four conditions: similar labels ("moogle" / "koogle") and similar categories (N=24), dissimilar labels ("moogle" / "kiff") and similar categories (N=24), dissimilar labels and dissimilar categories (N=18), and a silent condition with similar categories (N=24). We assessed (a) categorisation performance, by testing novelty preference with hybrid stimuli that combined features from both familiarisation categories, (b) word learning (preference for the named item), and (c) novelty preference for a novel out-of-category (OOC) item. Infants in the silent condition showed preference for both the OOC (p=.02) and the hybrid (p=.01), indicating formation of two distinct categories, even with similar visual sets. Infants also divided the same visual stimuli when presented with dissimilar labels (p=.02), but not when presented with similar labels (n.s.). However, there was no evidence for word learning in these conditions. By contrast, infants presented with dissimilar visual items showed evidence for word-category associations and showed a preference for the OOC item (p<.01), but failed to prefer the hybrid item, indicating a lack of visual encoding specificity. The results clearly show that both label and visual similarity contribute to the overall categorisation outcome.

A48 Teams Channel

A49 15-month-old infants flexibly gate the impact of spatial serial dependency effects by considering the correctness of previous choices

Joan Birulés[1], Anna Martinez-Alvarez[2], Ferran Pons[1], Alexis Pérez-Bellido[1] and Ruth de Diego-Balaguer[1,3]
[1]University of Barcelona, [2]University of Padua, [3]ICREA

Infants' remarkable learning skills require an optimal allocation of their attentional resources to the relevant stimuli in their surroundings. To do so, they must not only orient their attention to salient cues, but also learn to anticipate when and where a certain object will appear, based on the available cues and previous experience. Studying infants' anticipatory eye movements allows to unveil some of the mechanisms behind infant development of spatio-temporal attentional processes. Prior research has shown that whereas both 12- and 15-month-old infants exhibit spatial anticipatory behaviour based on symbolic cues, only 15-month-olds succeed in using the cue's temporal information (Martinez-Alvarez, Pons, & De Diego-Balaguer, 2017). However, it remains to be known whether infants' perceptual decisions can also be influenced by expectations built from recent experience (i.e., of previous trials). To investigate this question, we recorded 15-month-old infants' eye gaze while they performed an anticipatory eye movement task with two spatio-temporal symbolic cues that predicted the target's position (left/right) and onset time (2/4 sec). Our results replicated previous findings by showing that 15-month-old infants can use symbolic cues to temporally anticipate the target presentation. Crucially, however, results also revealed that infants' spatial orientation was not explained by symbolic cues but rather by their recent experience. Specifically, we found that infants' attention was spatially biased towards previously attended locations, and that the strength of such bias was gated by the correctness of previous spatial anticipations. We could not find that serial dependency effects took place in the temporal domain. Our results demonstrate that 15-month-old infants are able to adaptively downplay the weight of prior knowledge in their decisions. A similar strategy has been recently shown in rats (Hermosillo et al, 2020). Here, we extend these findings by showing that human infants already exploit this strategy at very early ages.

A49 Teams Channel

LCICD 2021

POSTER SESSION 2

Gather map of Poster Room B

B1 The Feasibility of a Father Focussed Rough-and-Tumble Play Intervention for Reducing Childhood Externalising Behaviour Problems

Erin Robinson[1] and Emily Freeman[1]
[1]The University of Newcastle, Australia

Childhood behavioural problems have been consistently linked to life-long psychosocial issues (Tremblay et al., 1995). With 14% of Australian children being diagnosed with an externalising behaviour problem, the Department of Health has flagged this as an urgent mental health concern (DoH, 2003). Parent focussed behavioural interventions have been shown to be effective in mediating behaviour problems; however, the rates of maternal and paternal participation are distinct (Phares et al., 2005). Fathers are largely absent from research focussed on the well-being of children, with various reasons being reported for lack of participation (Fabiano, 2007). These included not being asked to participate, wives/significant others did not encourage participation (Davison, Charles, Khandpur & Nelson, 2017), participation not suitable for working hours, interventions perceived to be maternal focussed and content was not applicable to fathers (Tully et al., 2017). This indicates the need for child behaviour interventions to be targeted to fathers. One such avenue is a play-based approach. Rough-and-tumble play is reported to be the preferred play type for Western fathers, which involves physically active wrestling, tumbling, and chasing (Pellegrini & Smith, 1998), with high quality RTP linked to decreased aggression, improved emotional-regulation and social skills (StGeorge & Freeman, 2017). Thus, we will examine the feasibility of a father focussed RTP intervention on the reduction of childhood externalising behaviour problems. Families with 4-5-year-old children will be recruited into a control, developmental or RTP group and undertake 3 phases of the intervention (baseline, intervention, and post-intervention). The measures used in this study will serve as a precursor for a potential larger pilot study. Analyses will be primarily descriptive in nature and focus on the key parameters necessary for conducting a future father-focussed play intervention. Feasibility will be determined by assessing the recruitment process (number of participants, retention/attrition rates across the three phases including a summary of reasons why interested parties did not consent to participate in the study) and also by compliance (completion of pre and post intervention questionnaires and intervention surveys). We expect to recruit 45 dyads, with 15 in each group (control, developmental and RTP), as per the sample size suggested for feasibility studies (Julious, 2005; Littlewood et al., 2019). The effectiveness of the intervention will be explored through pre and post-intervention assessments.

B1 Teams Channel

B2 The U-shaped relationship between working memory and complex planning in 2- to 3-year-olds

Lisanne Schröer[1], Richard P. Cooper[1] and Denis Mareschal[1,2]
[1]*Birkbeck University of London*

This study investigated whether toddlers are able to take into account multiple constraints to achieve an overarching goal, and the role of working memory (WM) in this ability. Fifty-seven children (24 to 36 months) completed a construction planning task using Duplo blocks to achieve the overarching goal of making a striped tower. The primary constraint was to build a tower to a height indicated on the wall. The secondary constraint was to make the tower striped, alternating between two colours blocks. WM was assessed with the spinning pots task. Both 2- and 3-year-olds struggled to follow the primary constraint in their action sequence planning. Only 20 participants were able to complete the tower to the correct height. Tower building ability was not related to age, but binary logistic regression showed that WM score was a significant predictor of the ability to successfully meet the primary constraint both in 2- ($\chi 2$ (1) = 7.482, p = .006, Nagelkerke R 2= .252) and 3-yearolds ($\chi 2$ (1) = 2.94, p = .086, Nagelkerke R 2= .238). Two-year-olds who were able to meet the primary constraint (M = 8.62, SD = 3.23) had a lower WM score than those who were unable (M = 11.71, SD = 3.04). Three-year-olds showed the opposite pattern; those who were able to meet the primary constraint (M = 14.29, SD = 1.60) showed a higher WM score than those who were unable (M = 12.00, SD = 3.38). We suggest that 2-year-olds struggle to keep track of both constraints, reducing the probability of completing the tower to the correct height, but that 3-year-olds with better WM are able to keep track of both constraints, improving their ability to align their actions to their goals. WM and complex action planning therefore appear to show a U-shaped relation in this age range.

B3 Children Born Preterm Show a Weaker Shape Bias
Cecilia Zuniga-Montanez[1] and Andrea Krott[1]
[1]*University of Birmingham*

Children born preterm tend to have smaller vocabularies compared to children born full-term (e.g. Brósch-Fohraheim, et al., 2019; Stolt, et al., 2009; Zimmerman, 2018). In children with language delays, smaller vocabularies have been related to the absence of a shape bias (Jones, 2003), that is the bias to generalise objects labels by the shape of the objects. However, it is unknown what word learning biases children born preterm use for object naming. In a pilot study, we explored if children born preterm and full-term show a shape bias and whether their individual extent of a shape bias is related to their vocabulary size as well as to their cognitive or motor development. We assessed a group of 10 children born preterm (M gestational age = 31.4 weeks; M age = 34 months; SD = 6.4) and a group of 8 children born full-term (M gestational age = 39.3 weeks; M age = 33.5 months; SD = 6.4) with a noun extension task, a cognitive assessment (WPPSI-IV UK) and the motor scales of the VABS – 3rd edition. The children's parents filled in a vocabulary checklist (Oxford CDI) and a general development and socioeconomic status questionnaire. Results showed that both groups had a shape bias for noun generalisation. However, when combining both groups, gestational age was correlated with the strength of the bias, meaning that children born earlier in the pregnancy relied less on it than children born later in the pregnancy. Participants in both groups also achieved expected scores for their chronological age in all standard assessments (vocabulary, cognitive and motor). But when both groups were combined, the shape bias in all participants was positively correlated to their vocabulary size and scores of the WPPSI-IV UK, but not to socioeconomic status or their motor skills. Further research is necessary to confirm these preliminary findings with a larger sample size.

B3 Teams Channel

B4 Mummy, read to me! Maternal reading style modulates toddlers' language skills

Christina Rosner[1] and Nicole Altvater-Mackensen[1]
[1]*Johannes-Gutenberg-University Mainz*

Reading picture books with toddlers is a common activity providing rich cues for language learning and fostering language development (O'Farrelly et al., 2018). Different variables have been identified to modulate the effect of shared reading on language development, such as the age at which parents start reading to their child, frequency of reading and reading style (Reese, 2019). While there is ample evidence that quantity and quality of infant-directed speech impact language learning (Cartmill et al., 2013), most of the research on shared book reading is carried out with pre-schoolers. Against this background, the current study explores individual differences in parental reading style and their influence on early language development in 18- to 24-month-old toddlers. We recorded 12 mother-child dyads during shared book reading of a preselected and a self-chosen picture book. Quality of maternal reading was coded along the dimensions of dialogic (Whitehurst et al., 1988), affective (Sonnenschein & Munsterman, 2002) and instructional quality (Bingham, 2007). Quantity and complexity of maternal speech was measured in terms of number of words (relative to overall length of reading), variety of words, and mean length of utterance. We further coded infants' enthusiasm and attention during reading (Frosch et al., 2001). Qualitative aspects of shared reading were also assessed in a questionnaire administered to mothers. Outcomes of a standardized language test (Szagun et al., 2009) assessing infant vocabulary size and early grammatical skills served as dependent measure. Preliminary analysis indicates selective positive effects of affective reading quality ($r = .625$, $p = .05$) and frequency of reading ($r = .689$, $p = .02$) on language development, while none of the other factors reached significance. Interestingly, self-reported and observational measures of reading quality only marginally correlated, highlighting the potential confound of social expectations in questionnaire data.

B4 Teams Channel

B5 Infants' Neural Processing of Speech in Parent-Infant Interactions

Katharina Menn[1], Christine Michel[2], Stefanie Hoehl[3] and Claudia Männel[4]
[1]*Max Planck Institute for Human and Cognitive Brain Sciences,* [2]*Leipzig University,*
[3]*Univertsity of Vienna,* [4]*Charité – University Medicine Berlin*

Infants are inherently social individuals and engage in social interactions long before they are able to speak. In addressing infants, adults correspondingly accommodate their speech in a characteristic way called infant-directed speech (IDS). Infants benefit from this speech register, as they prefer listening to IDS over adult-directed speech (ADS), and there are first indications of increased processing of IDS over ADS on a neural level. Yet, neural processing of IDS in social interactions has not yet been studied, specifically when infants are listening to their own parents' highly familiar speech patterns. We here investigated infants' neural processing of speech in a natural communication context, contrasting infants' responses to their parents' IDS versus ADS. In parent-infant dyads (n=31), parents described novel objects to their 9-month-olds while the infants' EEG was recorded. For IDS, parents were instructed to talk to the infant as they would typically do, while for ADS, parents were supposed to describe the objects to an adult. This speech manipulation was successful, as pitch and intensity measures were more pronounced in parents' IDS than ADS (all $p < .005$). Infants' neural processing of IDS and ADS speech was assessed by speech-brain coherence, which measures the phase consistency between the neural signal and the speech envelope. Analyses revealed significant speech-brain coherence at the syllabic rate (all pFDR-corrected < 0.008) in all 4 regions of interest (anterior/posterior and right/left). Contrary to our predictions, however, we did not find a difference in infants' speech-brain coherence to IDS versus ADS. In follow-up analyses, we will specify whether this pattern may change when separately considering the defining acoustic features of IDS. So far, our results imply a complex relationship between parents' speech adaptions in interacting with their child and infants' corresponding neural speech processing.

B5 Teams Channel

B6 A model of referent identification in the inter-modal preference looking task

Mihaela Duta[1] and Kim Plunkett[1]
[1]University of Oxford

We present a neural network model of referent identification in a preferential looking task. The inputs are visual representations of pairs of objects concurrent with unfolding sequences of phonemes identifying the target object. The model is trained to output the semantic representation of the target object and to suppress the semantic representation of the distractor object. Referent identification is achieved in the model based only on bottom-up processing. The training set uses a lexicon of 200 words and their visual and semantic referents, reported by parents as typically known by toddlers. The phonological, visual and semantic representations are derived from real corpora. The model successfully replicates experimental evidence that phonological, perceptual and categorical relationships between target and distractor modulate the temporal pattern of visual attention. In particular, the network captures early effects of phonological similarity, followed by later effects of semantic similarity on referent identification.

B6 Teams Channel

B7 Turkish- and English-speaking Children's False-Belief Understanding: The Role of Evidentiality and Source Monitoring

Birsu Kandemirci[1], Anna Theakston[2], Ditte Boeg Thomsen[3] and Silke Brandt[4]
[1]Kingston University London, [2]University of Manchester, [3]University of Copenhagen, [4]Lancaster University

Theory of mind (ToM) requires understanding that one's own or others' thoughts, beliefs, and intentions may differ from one another, and from reality (Premack & Woodruff, 1978). False-belief understanding (FBU) is an indicator of ToM, however certain factors may impact children's FBU, such as source monitoring (SM) and evidentiality. SM is the ability to track the source of one's information, e.g., whether the information was seen, heard, or inferred (Johnson et al., 1993). This ability can be scaffolded by the proficiency of a linguistic structure, evidentiality (Aksu-Koç et al., 2009). While some languages, including Turkish, obligate the use of evidential markers (e.g., linguistic marking of witnessed or hearsay information, Aikhenvald, 2015), in English specifying this information is optional. Learning a language with obligatory evidential markers can have an impact on children's social-cognitive development. For instance, Turkish-speaking 3- to 4-year-olds seem to be at an advantage in terms of their FBU performance, compared to their English- and Chinese-speaking peers (Lucas et al., 2013). The aim of this study was to investigate the specific role that source monitoring and evidentiality play in Turkish- and English-speaking children's FBU ability, while controlling for receptive vocabulary and memory. Overall, 100 participants (50 girls, Mage = 50.1 months, range: 42-59 months) took part in the study across two countries; Turkey and the UK. They completed three FBU tasks, two evidentiality tasks, an SM task, a receptive vocabulary task, and a memory task. A generalised linear mixed effects model (Bates et al., 2015) was used following the principle of backward selection (Gries, 2013). The final model suggests that the language children learned (suggesting advantage for Turkish), their memory, and SM ability significantly predicted FBU performance. We will discuss the potential reasons behind these findings and the importance of extending ToM research beyond Western languages and cultures.

B7 Teams Channel

B8 Study of labels phonological overlap across languages in bilingual toddlers

Daniela S. Avila-Varela[1] and Nuria Sebastian-Galles[1]
[1]Universitat Pompeu Fabra

Adult and young bilinguals co-activate their languages in different degrees even in fully monolingual tasks/context (Spivey & Marian, 1999; Von Holzen, Fennell, & Mani, 2018). Previous research has used cognate words as stimuli. Cognates are translations overlapping in their phonological form (e.g., English "chocolate" /tʃɒklət/ and the Spanish "chocolate" /tʃokolate/). Previously reported cross-language phonological effects cannot be attributed only to phonological overlap between labels because they also overlap at the conceptual level. Here, we analyse how phonological representations across languages influence word recognition of non-cognate words in three-year-old Catalan-Spanish bilinguals. We adapted the visual word paradigm by Chow, Aimola-Davies, & Plunkett (2017). Children saw four pictures. On test trials, after 4100ms an absent target was named in Catalan while children saw 4 pictures: A) a Catalan to Spanish phonological competitor (B) a Spanish to-Catalan one and C) two phonologically unrelated competitors to the absent target named. A logistic growth curve analysis of fixations up to 3000ms after word onset showed that across the trial children looked more at the Spanish to Catalan competitor than at the Catalan to Spanish competitor. These results support that young bilinguals activate phonologically related competitors in their familiar languages on monolingual settings.

B8 Teams Channel

B9 Maternal touch modulates infants' attention toward emotional faces

Victoria Licht[1], Margaret Addabbo[1] and Chiara Turati[1]
[1]*University of Milano-Bicocca*

Mothers frequently touch their infants during daily interactions, and affective tactile stimulations are fundamental to regulate infants' internal states in distressing situations. In the present study, we explored whether maternal touch could modulate 7-month-old infants' attention towards emotions. We measured Infants' looking times while infants observed, in a two-trial preferential looking paradigm, dynamic videos of an actress expressing happiness and anger. Importantly, infants were assigned two different experimental conditions: i) half of the infants received an affective touch (i.e., stroke) from the mother, ii) the other half received a non-affective stimulation (i.e., fingertip squeeze) from their mother. The frequency of maternal touch in the mother-infant dyad was also assessed through The Parent-Infant Caregiving Touch Scale (PICTS). Results have shown that, in the affective touch condition, as the frequency of previous maternal affective tactile care increased (PICTS), the avoidance of angry faces decreased. Conversely, in the non-affective touch condition, as the frequency of previous maternal affective tactile care increased (PICTS), the avoidance of angry faces increased as well. Thus, infants' attention to angry and happy facial expressions was modulated by both present and past experiences with maternal touch, which has the power of reducing infants' avoidance of potentially threatening and novel expressions.

B9 Teams Channel

B10 The use of Emojis by nonverbal children with Autism Spectrum Disorder

Anna Metreveli[1]
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This poster represents a research project developed from a small case-study focused on the use of emojis by nonverbal children with Autism Spectrum Disorder (ASD). The main research question of this project is whether children with ASD show similar patterns in their use of emojis compared with neurotypical preliterate children. Since both gestures and emojis are equipped to encode visual information, my main hypothesis is that some nonverbal children with ASD would be using emojis as communication tools, similar to how they use PECS, and other visual schedules or aid systems to substitute deictic gestures and verbal requests. Data from text messages containing emojis written by children with ASD will be collected and analyzed, as well as data from questionnaires for their parents/caretakers about the children's current learning and language situations. The preliminary findings from the previous small case-study suggest that nonverbal children with ASD use emojis as additional part of their spatial repertoire and pictorial modality, substituting deictic gestures with their use of emojis.

B10 Teams Channel

B11 Infants, but not adults, extract non-adjacent dependencies from segmental information

Ivonne Weyers[1], Jutta L. Mueller[1] and Claudia Männel[2,3]
[1]University of Vienna, [2]Charité–Universitätsmedizin Berlin, [3]Max Planck Institute for Human Cognitive and Brain Sciences

Successful language learning requires tracking of relationships between distant speech elements, as for example in the third-person marking of the verb in "he sings". Artificial grammar learning studies have demonstrated that both adults and infants are able to extract these so-called non-adjacent dependencies from auditory linguistic input (e.g., Friederici, Mueller & Oberecker, 2011; Frost & Monaghan, 2016). In particular, Mueller, Friederici & Männel (2012) showed that 3-month-olds successfully extract dependencies between specific, non-repeating syllables (e.g., letabu) from an auditory artificial language. When presented with the same materials, adults also showed evidence of learning of the syllable dependency, though only when given a target detection task. In the current study, we asked whether infants and adults necessarily rely on the syllable unit when processing such item-based dependencies, or whether the underlying structural generalization processes can also operate on smaller segmental units. Specifically, we tested the postulated functional role of vowels in structural processing, as suggested by the "consonant-vowel hypothesis" (Nespor, Peña, & Mehler, 2003). In two experiments, we measured adults' (n=22) and 8- to 10-month-old infants' (n=33) EEG while they listened to frequent standard exemplars of an exclusively vowel-based non-adjacent dependency (e.g., bokäwu, liwase), interspersed with deviant items violating the dependency (e.g., sogäle, kisüru). Adults did not show any behavioral or neurophysiological evidence of non-adjacent dependency learning. In contrast, infants showed in their EEG a positivity in response to the deviant compared to the standard items, peaking at around 400 ms after violation onset. Thus, while adults seem to be unable to automatically extract item-based non-adjacent dependencies from units smaller than syllables, we find clear evidence for this ability in infants for the case of vowels. Implications for the developmental trajectory of dependency learning and the general validity of the consonant-vowel hypothesis are discussed.

B11 Teams Channel

B12 The impact of cognateness on bilingual lexical access: a longitudinal priming study

Gonzalo Garcia-Castro[1], Serene Siow[2], Kim Plunkett[2] and Nuria Sebastian-Galles[1]
[1]Universitat Pompeu Fabra, [2]University of Oxford

Bilinguals activate both languages during word recognition and production, even in fully monolingual contexts. They perform differently when recognising or producing cognates (form-similar translation equivalents, like sofa-sofá) than non-cognates (like table-mesa) (e.g., Costa et al., 2000, for adults; Von Holzen & Mani, 2012, for toddlers). How this parallel activation impacts the early lexicon remains unclear. In this study, we explore the role of cognateness in word recognition. We are testing Catalan-Spanish monolingual and bilingual toddlers longitudinally at 21, 25, and 30 months of age using an adaptation of Mani and Plunkett (2010)'s priming paradigm. In each trial, toddlers weare first presented with a prime picture in silence. Then an auditory label is played, and finally two pictures are displayed side by side. One of the final pictures corresponded to the uttered label (target). According to M&P, toddlers implicitly name the prime picture. When the prime label phonologically overlaps with the target label (e.g., dog-door), it interferes with the recognition of the latter, leading to shorter target looking time. In our study, the prime picture depicted a cognate object (e.g., a cat, gat-gato) in some trials, and a non-cognate object (e.g., a dog, gos-perro) in others. We predicted that, if bilinguals activate both languages in parallel, they should generate one prime label in each language. If so, cognate primes (both prime labels overlap phonologically with the target) should interfere more strongly with target recognition than non-cognate primes (only one label overlaps phonologically with the target). We present preliminary data (ongoing data collection) from 23 monolinguals and 14 bilinguals tested at 21 and 25 months. Contrary to our predictions, target preference seems stronger in cognate trials, suggesting that the phonology of the prime labels boosts target recognition.

B12 Teams Channel

B13 Relationships between sensorimotor development and familiar word-form processing in the first year of life

Irene Lorenzini[1] and Thierry Nazzi[1]
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Early speech processing seems to rely on information extracted not only from speech perception but, less obviously, also by speech production. Indeed, production has been consistently shown to influence early lexical processing, as more advanced producers show longer orientation times to pseudowords containing consonants that they do not yet produce. Yet, the locus of this effect needs clarification: specifically, it is unclear whether production affects word-form encoding and/or recognition. This study aimed at disentangling such issue by testing the effect of production on the processing of real familiar words: ecologically encoded prior to testing, these items allowed to assess word-form recognition. Two groups of French-learning monolinguals (11- and 14-month-olds) were recruited and clustered at each age, based on their production skills. Using the Headturn Preference Procedure, each group heard two lists, each containing 10 familiar words composed of either early-learned consonants (commonly produced by French-learning infants at these ages) or late-learned consonants (rarely produced by French-learning infants). We hypothesized differences in orientation times as a function of list and/or production skills. At 11 months, participants with more advanced production skills displayed longer total orientation times to familiar words, signalling a generalized effect of production skills. At 14 months, participants with more advanced production skills oriented more towards the lists containing late-learned-consonants, extending previous findings to familiar word processing. At both ages, there was no significant difference in orientation times in less advanced producers. Our results establish that speech production impacts familiar word-form processing around the first birthday, demonstrating that production abilities impact early word-form recognition.

B13 Teams Channel

B14 Development of Infant Pointing and its Predictors

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Infants' pointing is a predictor of their later language abilities (Colonnesi et al., 2010). However, predictors of infant pointing are understudied. We collected infants' (N = 56) data monthly from 8 to 12 months. We measured their pointing production (when index-finger is clearly extended) using the decorated room (Liszkowski et al., 2012), and measured several candidate predictors of infant pointing: infants' point-following to targets in front of and behind them, caregivers' pointing production, and family socioeconomic status (SES, based on maternal education). To our knowledge, this is the first study to explore SES and point-following separately to front and behind objects to predict the development of infants' pointing production. A by-participant mixed-effects model was run to predict infant pointing frequency concurrently by infant point-following to front and behind objects separately, caregiver pointing, SES, and the interaction of each variable with infant age. Results revealed significant effects of infant age, SES, age and SES interaction, and age and point following interaction to behind objects. Post-hoc analyses indicated that (1) infants increased their pointing frequency across age, but this increase was more pronounced for infants from high-SES families (high-SES: $\beta=3.4$; low-SES: $\beta=1.0$), (2) pointing frequency averaged across age was higher for infants from high-SES families (p=.002), (3) infants' point-following to targets behind them was a predictor of infant pointing, but only at 12 months (p<.001). Caregiver pointing frequency was not predictive of infant pointing frequency at any age point. Taken together, these findings suggest that caregivers' SES impacts infants' pointing development not by simply pointing for their infants. Moreover, the predictive value of point-following to objects behind, but not in front, suggests that the former might reflect a better understanding of the referential nature of pointing.

B14 Teams Channel

B15 Early triadic interactions and their musical structuring: A situated approach for studying early engagement

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Classical theories of intersubjectivity hold that the first interactions in which children participate are dyadic (adult-baby). However, thanks to the material shift that is taking place in the cognitive sciences, an increasing number of authors began to recognise that, from the very beginning of life, interactions occur within a meaning-loaded material world that adults actively seek to bring to children. While in the field of dyadic interactions studies on communicative musicality have shown how interactive exchanges are structured and how this unfolds over time, little is known yet about the internal structure of early triadic interactions (adult-baby-object). We propose a longitudinal, mixed and multilevel methodological design aimed at describing the dynamics of the musical organisation of early triadic interactions and its development over different timescales. We observed six infants (three male, three female) at 3, 6 and 9 months of age interacting with their mother/father at home. They were videorecorded for approximately 10 min playing with the same object, a small-sized maraca. In order to leave space for participants to engage through their own strategies, we did not provide instructions about how to use the object so interactions remained as spontaneous as possible. Microgenetic analyses showed that things are not passive referents of our thought, but that with which and through which our cognitive becoming takes place. Rhythmic and sonorous uses of objects are frequent, suggesting that musicality could be a dimension of analysis of thought processes that happen with/through things. Further studies considering the cognitive relevance of things and the dynamics of our interactions with and through materiality are needed to fully understand early triadic interactions and their musical structuring.

B15 Teams Channel

B16 Does the sticky mittens effect replicate?

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Several studies have investigated the effects of sticky mittens training in the motor, social, and perceptual domain. The core of the sticky mittens training is that this procedure facilitates reaching and grasping abilities. In this training, 3-month-old infants interact with Velcro-covered toys while they are wearing mittens covered in the corresponding side of Velcro. Through accidental or intentional contact with the toys, reaching and grasping abilities are simulated and infants learn these abilities before they would normally emerge (Needham, 2016). Although the sticky mittens studies suggest a motor effect of this reaching training, a recent paper casted doubts on the robustness of this sticky mittens effect (van den Berg & Gredebäck, 2020). The current study aimed to examine whether the sticky mittens effect replicates in a pre-registered study and whether the sticky mittens effect could be demonstrated using detailed motion tracking technology. Three groups of 3-month-old infants received a daily, parent-led training for 2 weeks, with Velcro mittens and Velcro toys (32 infants, sticky mittens condition), without Velcro toys (32 infants, observational condition), or no training (32 infants, no training condition). We predicted that the sticky mittens training would result in an increase of successful reaching and grasping compared to the no training condition and the observational condition, which exposed infants to similar movements but without first-hand experience of the movement. Using motion tracking technology, we assessed infants' abilities to reach and grasp for objects before and after training. The sticky mittens training did not facilitate reaching and grasping. The number of reaches, reach duration, the number of movement units, grasping aperture, and grasp preparation did not differ between the three conditions. Based on this sample and these current measures, this study indicates that the sticky mittens effect did not replicate.

B16 Teams Channel

B17 Learning to learn: infants generalize statistical regularities to structure their learning

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At birth, infants know little about the world around them, but their powerful statistical learning abilities allow them to rapidly acquire information. Here, we examine whether in addition to accumulating information, infants also generalize from it to further structure their learning. To explore this, we tested 90 infants (mean-age=8.0 months) on an eye-tracking task in which they watched 16 sequences of cue-target pairs. Each sequence consisted of a different shape that was first presented as a cue in the middle of the screen and then displayed in one of four possible locations as a target. In each sequence, the target was most likely to appear in one of the four locations (60%, 80% or 100% probability), but the most probable location varied across sequences. Hence, all sequences were different but had the same underlying structure. Extracting this structure from early sequences would allow infants to infer the most likely target location from just a few trials, speeding up learning for later sequences. Using a computational modelling approach, we tested whether infants inferred this general structure and used it to shape their learning (i.e., meta-learning). Preliminary results suggest that infants successfully generalized evidence from early sequences to up- and down-regulate the impact new information had on their internal model. Infants did not only track statistical regularities, but also learned to optimize their learning, flexibly assigning different weights to new evidence.

B17 Teams Channel

B18 Neural and facial responses to observed emotional touching gestures in infancy

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The sense of touch possesses high social and affective features early in life, as infants explore their environment through touch and receive continuous tactile sensations from their caregivers. Despite the unique communicative function of touch during development, so far, very little is known about how infants process others' tactile experiences. This talk will address infants' neural and facial responses to observed emotional, positive and negative, tactile gestures. First, infants' neural responses to the observation of others' painful experiences will be taken into consideration. ERPs (Event-Related Potential) revealed that 6-month-olds' neural activity differentiated an observed painful poke in the eye from a neutral touch on the eyebrow. Moreover, infants' facial electromyographic (EMG) activity in response to positive (caress) and negative (scratches) observed touches will be examined. Facial EMG activity was measured over the muscles involved in smiling (zygomaticus major, ZM) and in frowning (corrugator supercilii, CS), while 11-month-old infants observed videos showing an actress receiving a caress or a scratch on her arm. Our results showed increased activation of the ZM muscle and no activation of the CS in response to caresses, while none of the two muscles were activated in response to the observation of scratches. Thus, infants showed selective and emotionally congruent facial responses while viewing caresses, and not scratches. Overall, results highlight the fundamental role that tactile stimulations have as carriers of sensory and emotional information since very early in life.

B18 Teams Channel

B19 Disentangling the role of bottom-up and top-down processing in infants' action segmentation

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Action segmentation, the identification of individual actions from a continuous action sequence, is a critical stage of action processing. Previous work has concluded that action segmentation processes are active already during the first year of life, by demonstrating that young infants are sensitive to the location of boundaries between the individual actions of a sequence (Baldwin et al., 2001). Less well understood, however, are the mechanisms that drive infants' action segmentation. Some have argued for a role of top-down knowledge-based processes, by which infants track actors' intentions and determine boundary location according to goal achievement (e.g., Saylor et al., 2007). However, recent work with adults has suggested that bottom-up perceptual cues, specifically kinematic properties of the motion forming the actions, can also signal the location of boundaries in an action stream (Hilton et al., 2019). It is therefore possible that infants capitalize on these lower-level kinematic cues when segmenting action sequences. We present here the initial study in a planned series that aims to disentangle the role of top-down conceptual and bottom-up perceptual processing in infants' early action segmentation. We recorded 12-month-old infants' looking times while viewing videos of unfamiliar action sequences, in which human hands form and mould objects from soft plasticine. Pauses were inserted either at the boundaries between individual actions, or during the actions themselves. Making use of either top-down intention tracking, or bottom-up kinematic cue detection, pauses during actions should be less expected than pauses at the boundary between actions, resulting in looking-time differences. We will present preliminary data from this study, which we will use to determine the suitability of this looking-time paradigm for later adaptions that aim to specify the role of bottom-up and top-down processing during early development.

B19 Teams Channel

B20 Self -regulation in preterm born toddlers- longitudinal perspective

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Early individual differences in self-control are predictive of numerous developmental outcomes, such as physical health and risk-taking behaviors. There are several known attentional and situational strategies for self-control that have been studied both in children and adults (Mulder et al. 2019, Duckworth 2016). In children born prematurely, these abilities are sometimes compromised (Hüning et al. 2017). Therefore, it is important to improve our understanding of how toddlers born preterm manage to exert self-control. Also, we set to study predictive patterns from infant and caregiver (stress) regulation to child regulation in toddlerhood. This study investigated 30 months old toddler's behaviors during a delayed gratification task. Preterm-born toddlers (N = 50, mean gestational age 32.7±1.3 weeks) and controls (N = 20) were given a "tea party" snack delay gratification task to measure self-control at 30 months. The direction of visual attention (focus, distract) was coded second-by second during the delay. The preterm cohort was part of a longitudinal study exploring the association between early developmental (GA, and IBQ-9 months and Bayleys Mental Index- 12 months) and parental factors (PSI-4 months), with a particular focus on self-control strategies at 30 months of age. Preterm infants failed the task significantly more often than controls (p=0.01). The percentage of time that children distracted their gaze from the snack was significantly higher in controls (M=44 sec) compared to preterms (M=32 sec), p=0.001. In the preterm group, developmental and parental factors including parental stress distress to limitations and developmental score explained 33.6% of the variance in the percent of distracting gaze during a delayed gratification task at 30-month. Findings point to different strategies used by dyads as a function of prematurity in real-time. The longitudinal predictive model delineates the inter-relations between infant and parental factors in self-regulation of toddlers born preterm, as they unfold in time. Implications point to the importance of parental stress, temperament, IQ during the first year of life in shaping the toddler's ability to use attentional strategies in support of self-control.

B20 Teams Channel

B21 Young children show a lower body posture after failing to help others

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Young children's expression of social emotions, such as shame or guilt, indexes their obligation to adhere to standards regarding proper conduct, as well as for cooperation (Kagan 1981; Kochanska et al., 2002). Key aspects of the early development of these emotions remain poorly understood. Progress in this area of research has been stifled by a lack of methods to measure children's emotions. For instance, it is currently unclear if and when failing to help others elicits a negative emotional response in young children. Moreover, it is unclear whether children express negative social emotions to show concern with social standards to observers. Here, we applied a novel method to measure children's emotional expression automatically using a Kinect motion depth sensor imaging camera (Hepach et al., 2015; 2017). In Study 1, 5-year-old children (N = 68) expressed a lowered upper body posture (a) in response to being unable to help someone in need, and (b) after being unable to complete their own goal compared to the resolution of the situation, $\chi 2(1)$ = 10.45, p = .001. Failing to help others lowered children's body posture regardless of whether they were observed or not. To investigate the development of this emotional response and to replicate the findings of Study 1, we conducted a second study. In Study 2, 4- to 5- year-old children (N = 93) showed a lowered upper body posture in response to a failure to help compared to the resolution of the situation, $\chi 2(1)$ = 4.23, p = .04. An exploratory analysis showed that 5-year-olds' upper body posture decreased more than 4-year-olds', $\chi 2(1)$ = 5.61, p = .02. Like in Study 1, failing to help lowered children's body posture regardless of whether they were observed. Our findings suggest that young children—especially 5-year-olds—possess an intrinsic obligation to help others.

B21 Teams Channel

B22 Exploration and exploitation in infants' curiosity-based learning

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Infants explore the world to learn about it based on their intrinsically motivated curiosity. However, the mechanisms underlying such exploratory behaviour are largely unknown. Here, we will address this question by investigating infants' choices of exploring diverse information vs. exploiting more familiar information in a gaze-contingent eye-tracking task. In our initial study, 10-month-old infants will be introduced to two novel stimulus categories with 30 exemplars each (Fribbles, TarrLab). Two identical "houses" will be presented on a computer screen, and a new exemplar from either category will be revealed when the infant fixates on the corresponding house. This design will enable us to distinguish between exploration – switching from one category to the other – and exploitation – consecutively triggering exemplars from the same category. In follow-on studies, we will test older children as well as adults, who will be able to trigger exemplar presentations via key presses. Across age groups, we will measure the number, speed, and sequence of trigger-events, as well as the switches between categories. Thereby, we will investigate to what extent exploratory behaviour is comparable across participants and if there are systematic individual differences between weighing exploration against exploitation. As the outcome of this research, we expect to better understand the developmental trajectory of curious, active exploration including possible individual differences. Additionally, we plan to explore whether such characteristics are stable over time and whether they relate to other measures of personality and cognitive development. In conclusion, we aim to build a comprehensive new body of research crucially integrating a universal perspective on infant curiosity with a focus on individual differences (Perez-Edgar et al., 2020).

B22 Teams Channel

B23 Playing hide and seek: What environmental cues drive young children's memory-guided attention and further learning

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In everyday life, we are surrounded by many environmental regularities, which we use to guide our behaviour and navigate our environment. For example, we learn how the products are organised at the supermarket and we become faster at finding them. There is a large body of evidence showing that, in adults, repeated exposure to the same visual context leads to faster attentional deployment and target detection (Chun,2000). However, this phenomenon, known as contextual cueing effect, is less robust in children, and, to the best of our knowledge, it has never been explored in toddlers (Jiang et al., 2019). The present study aims to investigate the development of memory-guided attention between 3 and 5 years of age. Children are presented with fixed spatial configurations of bushes and are asked to guess behind which bush a monkey is hiding. Each configuration is made by three green bushes and one pink bush, behind which the target always hides. After this learning phase, participants complete a preferential-choice task. Specifically, across three different conditions, they are asked to indicate where the monkey is more likely to be, choosing between a spatial configuration previously observed and a new configuration in which bushes are displaced randomly. Random configurations are composed of green-bushes-only (control condition) or both green and pink bushes (colour condition). Lastly, in the spatial condition, only green bushes are presented both in the fixed and random configurations. Children's performance across conditions will allow us to test whether salient colour information and spatial context are both at play in guiding their behaviour. Pilot data showed a ceiling performance in the learning phase and the control condition, indicating that the task is suitable for 3-to-5-year-old children. The ongoing data collection will help us to disentangle which environmental cue guides young children's memory-guided attention and further learning.

T|i B23 Teams Channel

B24 Gaze aversion in 4-year-old children during speech disfluencies

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Nonverbal communication, such as gaze or gaze aversion by both adults and children, provides meaningful information to interlocutors (Kidwell, 2014; Doherty-Sneddon, et al., 2002). According to the cognitive load hypothesis of gaze aversion, people avert their gaze during demanding tasks to free cognitive resources (e.g., Phelps, Doherty-Sneddon, & Warnock, 2006). While this line of research has investigated gaze aversion mainly experimentally in children older than 5 years of age, its use while speaking in a more natural setting has not been studied in young children. Therefore, we observed 4-year-old children with a caregiver while reporting on a prior experienced event. These events were performed by an experimenter using a hand puppet that did everyday activities the wrong way; caregivers were not present meanwhile. Here, children's gaze behavior during the report on one of these events was analyzed. We hypothesized that children avert their gaze from their caregiver more often during speech disfluencies than during fluent speaking, and that they would more likely overcome these word-finding difficulties after they averted their gaze compared to no gaze aversion. 14 of the 45 children reported on the event. The results partially support the hypotheses: we observed a significant interaction effect between gaze and speech fluency, $F(1,13)=8.58$, $p=.01$, $eta2=.09$. Post-hoc comparisons revealed that if children spoke disfluently, they averted their gaze marginally more often ($M=2.29$, $SD=1.2$) than maintained gaze ($M=1.07$, $SD=1.07$), $t=-2.3$, $p=.06$. Further, they significantly more often maintained gaze together with fluent ($M=4.29$, $SD=1.98$) than with disfluent speech, $t=-7.17$, $p<.001$. The children were also more likely to overcome their disfluency following gaze aversion than following gaze, $t=-4.6$, $p<.001$. These results extend previous research on gaze aversion in two ways: They show that already 4-year-old children spontaneously avert their gaze in verbally demanding situations. Second, gaze aversion also seems to be related to reducing cognitive demands in communicative situations.

B24 Teams Channel

B25 On the feasibility of using a mobile app to measure receptive vocabulary in toddlers

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The widespread use of mobile touchscreen devices in the home provides the opportunity to conduct remote experimental research with toddlers. However, as far as we are aware, there is no readily available validated tool to collect overt responses from children under 3-years. We present a study of the feasibility of a mobile app to measure receptive vocabulary in toddlers. Our sample consisted of 118 toddlers ranging from 20- to 36-months-old. The parents of the toddlers were first asked to complete the OCDI as a measure of their child's vocabulary. Parents then completed a receptive vocabulary task with their child on their own touchscreen device at home. The task consisted of 32 'target and distractor' pairs of visual objects. Auditory stimuli prompted toddlers to identify the target by tapping the device screen, or by pointing for their parent to tap on their behalf. We evaluated the app's feasibility in terms of toddlers' engagement with the task and the systematicity of their responses. We expected toddlers who engaged successfully would provide valid responses (i.e., > 0.35s response latency, no repetitive taps on screen) for at least 28 of the 32 trials. Furthermore, the accuracy of these responses would be predicted by parental OCDI reports of words which toddlers know. The toddlers' response accuracy was well above chance and they were highly likely to respond significantly more accurately to words their parents reported as known. For some words reported as unknown, however, toddlers' response accuracy was also well above chance suggesting that parental OCDI reports, and similar questionnaires, may underestimate toddlers' vocabulary knowledge. We suggest further research which focuses on using app-based tasks like ours to obtain direct, short-form measurements of toddlers' receptive vocabulary knowledge.

B25 Teams Channel

B26 Social and non-social visual attention in hearing infants with deaf mothers

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Parent-child interactions (PCI) are an important contributor of cognitive and language development. In early development, visual attention is a vital part of communication between infant and caregiver. Research including less studied populations like hearing infants with deaf mothers show that speech and language experience can impact infants' social visual attention. The aim of these analyses was to investigate PCI in hearing infants with deaf mothers compared to hearing infants of hearing mothers in their first year of life. More specifically, we compared (1) infants' social and non-social attention and (2) parental activity on objects. We hypothesized that hearing infants with deaf mothers will show more social attention and their mothers will be more active with objects. The sample reported here consisted of 64 dyads, divided into 3 groups: monolinguals (M; N=22), unimodal bilinguals – hearing infants with hearing mothers exposed to 2 or more spoken languages (UB; N=18) and bimodal bilinguals – hearing infants with deaf mothers (BB; N=24), aged 4-8 months of age. We coded 4-to-5 minute videos of free play with toys. The coding scheme included infant visual attention, parental touch, and dyadic touch. We found that BB infants tended to look more often at their parent's face than M and UB, but the difference did not reach statistical significance. Moreover, BB infants looked more frequently and spent more time looking at objects manipulated by their caregiver than M and UB; thus they spent less time looking at other objects than M and UB. Caregivers from BB group manipulated toys more often and for a greater proportion of the interaction than caregivers of M and UB. Finally, we found that dyads from BB group more frequently engaged in dyadic activity on toys than M and UB. These results show early differences in infants' visual attention during social interactions depending on their language experience.

B26 Teams Channel

B27 The transition from non-weight bearing to independent walking: understanding the role of the foot in the development of walking

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Once infants become upright, the foot becomes the principal interface with the environment, providing sensory input and facilitating movement progression and stability. Weightbearing stimulates a progressive sequence of tissue and structural development where the dimensions, shape and function of the feet evolve in response to regular, cyclic loading. The ongoing development of the foot remains central to advancing engagement with social and physical environments. However, the changing biomechanical and biophysical properties of the infant foot during the pivotal transition to independent walking has received limited attention. As part of the Great Foundations Initiative [1]: in a two-site, four visit longitudinal study of 85 infants, we have captured the biophysical properties of the foot skin, the changing plantar pressures acting on the feet and the infant lower limb and foot motion throughout this phase. The research undertook biomechanical testing, with a flexible protocol and a child-friendly laboratory environment. One data set within this study utilises motion capture (Qualisys, Vicon) and plantar pressure platforms (Emed-xl, Novel) to capture the development of infant gait from early walking to more confident walking. The number of steps undertaken, the direction of these steps and the speed of them were compared. The plantar pressures, lower limb motion and foot clearance were also quantified between these two walking milestones. Results indicated an increase in number of steps (x1.9) and proportion of turning steps (x2.3) in more confident walking. Pressures on the foot of the more confident steps were higher in the rear and lateral foot. Contact area and time variables also indicated a greater foot size and a faster transition through foot regions. Foot clearance data demonstrated that early walking steps had higher toe clearance values. Overall, the data collection identified some key features of developing gait, which establish differing demands being placed on the foot.

B27 Teams Channel

B28 Vocabulary development in infancy: revised Oxford Communicative Development Inventory

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Communicative Development Inventories (CDIs) are tools for gathering information about infants' receptive and productive vocabulary through parental reports. We present an update of the norming data for the British infant population as reported in (Hamilton et al, 2000). Data was collected using a revised and extended version of the Oxford CDI (Ox-CDI), which includes 553 words; by contrast, the previous version of the Ox-CDI reported in (Hamilton et al, 2000) listed 416 words. The data was collected from more than 1,500 infants (aged 8 to 36 months) from British English monolingual families, over a period of 5 years. The caregivers were sent a link to an online version of the OxCDI prior to their visit to the laboratory. For each word in the Ox-CDI they were asked to tick one of three boxes: child understands the word, understands and says, and doesn't know the word, which allowed each child to be given a comprehension and production score. The general trends in receptive and expressive vocabulary are as expected for these age groups: the receptive vocabulary increases roughly linear with age, and we note an acceleration in the rate of growth of the expressive vocabulary in the second year. Gender differences in vocabulary development, particularly expressive vocabulary, seem to increase with age, especially in the second year. We will present detailed analysis of growth curves for vocabulary size, comparing them with (Hamilton et al, 2000). Our preliminary analysis shows a trend in more recent years for infants to learn more words at an earlier age, particularly words from categories such as animals, food and games/routines.

B28 Teams Channel

B29 The process of self-control in toddlerhood: A two-site cross-cultural study

Hanna Mulder[1], Maya Weinstein[2], Irene Sloeserwij[1], Shira Dizitzer[2] and Ronny Geva[2]
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Early individual differences in self-control predict adaptive outcomes. Therefore, it is important to understand how young children manage to control themselves. Situational strategies (modifying the situation to facilitate control) and attention distraction are important for self-control. This study tests this supposition in toddlers in two cultures, and explores parent-child behavioural contingencies in the recruitment of such strategies. Dutch (N=29) and Israeli (N=20) toddlers completed a gift delay and 'tea party' snack delay task to measure independent self-control and self-control in interaction, respectively. Percentage of time child hands withholding (e.g., by placing hands under the table; situation modification) and gaze aversion (attention distraction) occurred prior to the child's first touch of the gift and snack, and percentage of time parent gaze aversion, verbal distraction and rule repetitions occurred prior to the child's first touch of the snack were coded. Child gaze aversion (GA) and hands withholding (HW) predicted gift delay performance across sites (GA: OR=1.07; p=.002; Netherlands: OR=1.07; Israel: OR=1.13; HW: OR=1.02; p=.024; Netherlands: OR=1.02; Israel: OR=1.02) and tea party performance across sites (GA: OR=1.08; p=.002; Netherlands: OR=1.08; Israel: OR=1.07; HW: OR=1.04; p=.002; Netherlands: OR=1.03; Israel: OR=1.07). Parent verbal distraction was the only parent behaviour that consistently related to one of the effective child strategies in the tea party (GA: T=.49; p<.001; Netherlands: T=.55; Israel: T=.34). Parent verbal distraction followed child gaze aversion more often than vice versa in children who managed to be successful (contingency analysis: t(25)=3.446; p=.033). These preliminary findings show that toddlers use physical self-limiting strategies, situation modification and attention distraction, to facilitate self-control. Results held across two tasks and cultures. The cross-cultural uniformity observed suggests that basic regulatory strategies in early life may to a certain degree be universal. Child behaviours appeared to be leading rather than lagging in dyadic regulatory interactions in time.

B29 Teams Channel

B30 Maternal Verbal Directives to Toddlers with Down Syndrome: Evidence for Maternal Attunement to Child Language

Imogen Macaulay[1], Desiree Grafton-Clarke[1], Elizabeth Nixon[1] and Jean Quigley[1]
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Infant-directed speech (IDS), the patterns of speech that caregivers produce when interacting with infants, scaffolds language development. Directives in CDS, utterances that seek to control or direct child behaviour, are a focus of attention in this literature. Directives can be intrusive or supportive, depending on whether they are sensitive to a child's focus of attention (Landry et al., 2000). With typically developing (TD) children, mothers use fewer directives as their child's language develops. However, few studies have examined whether child language influences maternal directiveness in the context of Down Syndrome (DS). The current study investigated associations between language ability of children with DS and maternal use of directives. 21 mothers and their toddlers (Mage = 22.53 months, SD = 8.79) were recorded during 5 minutes of dyadic freeplay. Maternal speech was transcribed and coded for intrusive and responsive directives, adapting a coding scheme developed by Paavola-Ruotsalainen et al. (2017). To control for amount of maternal talk, intrusive and responsive directives were computed as a ratio of total maternal utterances. Child language was assessed using the Bayley Scales of Infant and Toddler Development, 3rd edition. Child composite language score was positively associated with maternal responsive-directives, R^2= .42, t(20)= 3.714, p=.002, but negatively associated with intrusive-directives, R^2 =.41, t(20)= -3.625, p= .004. Mothers used a lower proportion of intrusive-directives but a higher proportion of responsive-directives when children had higher language scores. These findings suggest mothers of children with DS attune their use of directives to child language ability, and furthermore, when maternal directives are responsive to child attention, they may provide a positive infrastructure for language development.

B30 Teams Channel

B31 Use of Mental State Terms by Mothers of Children with Down Syndrome and Child Expressive Language Ability

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Parents' mental state talk is important for child social-emotional, cognitive and language development (Olson & Masur, 2020). However, few studies have examined mental state terms (MST) towards children with Down Syndrome (DS). Tingley and colleagues (1994) suggested that mothers of children with DS use fewer MSTs in response to expressive language delays. The present research aimed to examine this association between child expressive language and maternal MSTs. The frequency and types of MSTs were also compared to those produced by mothers of typically developing (TD) children matched on chronological age. 26 mothers and their children with DS (Mage= 28.53 months, SD= 14.88) and 26 TD mother-child dyads (Mage= 24.07 months, SD= 1.38), were recorded during freeplay. Audio recordings were transcribed and analysed for MSTs using a coding frame adapted from Olson and Masur (2020). Child expressive language was measured using the Bayley Scales of Infant and Toddler Development, 3rd edition. Regression analyses revealed a negative association between child expressive language and frequency of maternal MSTs by mothers of children with DS (controlling for amount of maternal talk), B = -3.17, p = .01, contrary to the prediction that maternal MSTs would be positively associated with expressive language. The results also did not support the hypothesis that total MSTs would differ across mothers of TD and DS children, t(52) = -5.17, p = .60. However, mothers of children with DS used fewer cognition MSTs, t(51)= -2.08, p <.05. The present research contributes to our understanding of the linguistic environments to which children with DS are exposed.

B31 Teams Channel

B32 The role of sound patterns on early word learning and language development in typical and atypical toddlers

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Word learning requires mapping sound sequences to a referent. Early word learning is shaped by the native phonotactic frequency patterns—high frequency sequences being learned earlier [1]. Interestingly, word learning is possible if sequences include non-native phonemes [2], but not if native sound sequences break a phonotactic rule [3]. The present study examines both phonotactic frequency (high/low probability pseudowords-HP/LP) and phonotactic rules (illegal sound sequences-IS) to assess their impact on early word learning and language development in typically-developing (TD) and at-risk (AR) toddlers. Thirty-one TD (mean age 20.4 months) and 29 AR (mean age 20.7 months) European Portuguese-learning toddlers' eye gaze was assessed in a word learning task, similar to [1]. The AR included premature toddlers (<37 weeks) or with risk for autism or language disorder. The task included a training phase (an object is labeled 6 times, and another object is presented, but unlabeled) and a test phase (both objects presented, while listening to familiar or unfamiliar label). Labels were C1VC2V disyllabic sequences. HP included high frequency C1 and C2, LP included low frequency C1 and C2, whereas IS had an illegal prosodic word onset. In addition, we assessed infants' language development with the European-Portuguese CDI short forms [4]. The linear mixed-model analysis revealed that the only difference between labeled and unlabeled objects was in the TD toddlers (t=3.48, p=.0008) in the HP condition. Correlation analyses on a subset of infants revealed a positive correlation between concurrent expressive vocabulary score and word learning ability in the HP condition for TD (for TD r(20)=.46, p=.03; for AR r(23)=.34, p=.09). No other effects were observed. The study suggests that high frequency patterns guide TD toddlers' early word learning, promoting language development. AR toddlers showed no phonotactic frequency effect, suggesting either phonological delay or a different developmental path.

B32 Teams Channel

B33 Static and dynamic face processing in 15- to 18-month-old monolingual and bilingual infants

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Bilingual infants may rely differently than monolinguals do on facial information, such as lip patterns, to differentiate their native languages. This may underlie experience-related variability in infants' developmental trajectories for social attention. For example, in the first year of life, bilinguals attend faster and more often to static faces over non-faces in a complex array than monolinguals (Mercure et al., 2018). Bilinguals also spend longer looking to the mouths of dynamic, talking faces than monolinguals (Pons et al., 2015). However, it has remained unknown whether group differences in face looking in the first year persist into the second year. Here, data were collected from 15- to 18-month-old infants learning either English (monolinguals) or English and another language (bilinguals) on static (n = 58) and dynamic (n = 65) face processing tasks (i.e., face pop-out, Gliga et al., 2009; 50 faces, Vö et al., 2012). We predicted that bilinguals would orient more rapidly and more often to static faces over non-faces in a complex array than monolinguals. For dynamic, talking faces, we expected bilinguals to look more to mouths than monolinguals. Results revealed that bilinguals did orient more rapidly to static faces over non-faces in a complex array than monolinguals (t(55.91) = 2.00, p =.05, d = -0.51), but there were no group differences in number of returns to the face. While viewing dynamic social scenes, bilinguals did not spend more time looking to the mouths overall but did dwell significantly longer per look to the mouth compared to monolinguals (t(61.09) = 2.23, p = .029, d = 0.56). Taken together, the results suggest that some but not all of the early-to-emerge differences between monolingual and bilingual infants' attention to static faces persist into the second year. Further, bilinguals may use different mouth-looking strategies than monolinguals when viewing naturalistic social scenes.

B33 Teams Channel

B34 Maternal depressive symptoms and early childhood temperament before and during the COVID-19 pandemic in the United Kingdom

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The COVID-19 pandemic has fundamentally changed the environment in which infants and young children are developing. Research has already highlighted increased rates of depression among pregnant and new mothers during the pandemic. However, the potential impact of the pandemic on maternal depressive symptoms, early childhood temperament, and their associations, remains largely unknown. The aim of this research was to longitudinally investigate the impact of the pandemic and related national lockdowns in the United Kingdom (UK) on maternal depressive symptoms and child temperament. In Sample 1, mothers (N = 175) completed online depression and temperament questionnaires before and during the pandemic when their child was 10- and 16- months old. In Sample 2 (partially overlapping with Sample 1), mothers of young children (N = 220, 6 – 48 months) completed questionnaires during the first and second national UK lockdowns in 2020. An additional COVID-19 Impact questionnaire was completed by Sample 2. Parents in both samples were already participating in ongoing infant cognitive development studies and were primarily of high socioeconomic status, as indicated by maternal education (M = 17.91 years). Results indicated significant changes in temperament across the age range and associations between maternal depressive symptoms and child temperament were present. As measured by the COVID-19 Impact questionnaire, mothers reported increases in pandemic-specific depression and anxiety, however no pandemic-related increases in maternal depression as measured by the Beck Depression Inventory (BDI) were observed, nor any negative prediction from BDI scores to temperament scores in infancy and early childhood. These results suggest no specific pandemic-related consequences on maternal mood as measured with gold-standard depression instruments and on the child's temperament development, at least by the second UK national lockdown and in a relatively high parental education and income sample of mother/child dyads. Further follow-up, and comparisons with diverse samples are planned and needed.

B34 Teams Channel

B35 TEACH-BRITE: Transforming Early ChildHood- Bringing Research to Individuals through online Technology

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Birkbeck, University of London, [2]Kings College London, [3]BabyBrains, [4]University of Cambridge

Since smartphone use is now relatively ubiquitous, it is timely to explore how we can use these technologies in the field, particularly to increase the participation of families who are typically missed from developmental research. Increasing diversity is critical to increasing generalizability of findings and creating effective support for the populations who may benefit the most from early intervention. Simultaneous overrepresentation of one demographic and underrepresentation of others may lead to a skewed interpretation of what constitutes 'typical' development and consequently of what is 'atypical'. We are leveraging technological developments to gather data from typically hard-to-reach populations with reduced demands for participants and their families. We have developed an app for collecting information about child behaviour in low resource (i.e. non-laboratory, 'real life') settings. The app consists of activities that the parent tries with their child; the parent then reports on their child's behaviour. The current stage of this research involves collecting data via the app and also via more traditional parental questionnaires about children's development. Parents will also be asked to provide information about their family's socio-economic status (SES) and to provide feedback about the app. This can all be achieved remotely, meaning there is no need for in-person assessments and a broader group of families may be reached. Data collection will begin soon and we hope to present some preliminary data at the conference. Analyses will investigate the relation between data gathered via the app and via questionnaires, and will also consider the SES of the sample included, using feedback from parents to improve the app.

B35 Teams Channel

B36 The interplay between noise, sleep and sensory processing during infant development

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While it is known that environmental noise negatively affects many aspects of development during school-aged years (Shield & Dockrell, 2003), it is still unclear how and what aspects of noise may be affecting early infant development, particularly sleep and sensory processing. Furthermore, the difficulty with measuring the ever-changing infant sleep pattern has led to mixed findings on how sleep affects infant development (e.g. Tikotzky & Volkovich, 2019). Sixty-nine 10-to-12-month-old infants were included in the current study. The novel facet of this study was the direct measure of in-home noise using an SLM, both from the room the baby sleeps in and another room the baby spends many hours in, giving a clear indicator of the infant's experience with environmental noise. Furthermore, sleep was measured using both the BISQ and a Sleep Diary, and the Toddler Sensory Profile 2 Questionnaire was used to measure auditory and general sensory processing. Principal component analyses were used to reduce the dimensionality of the sleep and noise measures. The BISQ had two components, night sleep disturbance and day sleep, and the Sleep Diary had a night sleep disturbance component and a sleep duration component. Interestingly, the two noise measure components were noise from the baby's room and noise from the other room, rather than being grouped based on specific aspects of the noise (e.g. noise fluctuation). These were then used as predictor variables in further regressions, which revealed that while noise did not influence sleep, noise from the other room significantly predicted better auditory processing ability ($r2 = .096$, $p = .023$). Furthermore, higher night sleep disturbance (BISQ only) predicted significantly worse general sensory processing ability ($r2 = .109$, $p = .012$). These results make evident the importance of directly measuring in-home noise and using various sleep measures to better understand infant development.

B36 Teams Channel

B37 Time perception in 4- and 9-month-olds using an oddball paradigm

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This study examines the development of time perception in the first year of life with a combination of eye tracking and EEG measures applied to an auditory oddball paradigm. Infants aged 4 months (n = 34) and 9 months (n = 34) took part in this study. A ball shown on a computer monitor repeatedly bounced on a surface. Contact with the surface produced a pure 500Hz tone. The tone lasted for 600ms (standard duration) for 80% of trials. The tone lasted 300ms (short oddball) for 10% of trials; and 900ms (long oddball) for the remaining 10% of trials. Infants were presented with 40 trials in total (32 standard, 4 short, and 4 long tone durations), in a random order. A Tobii X120 system (sampling @ 60Hz) was used for eye-tracking. EEGs were recorded with an EGI Geodesic system (128 electrodes, sampling @ 500Hz). (i) Eye tracking; Pupil diameter was averaged from both eyes, low-pass filtered, with missing samples linearly interpolated. Analyses do not suggest significant differences between conditions for 4-month-olds. However, differences in onset and amplitude of responses by condition are reported for 9-month-olds. (ii) ERPs; In 4-month-olds, the responses of both auditory cortices discriminate between standard, short, and long durations. We do not report such a discrimination for the left frontal cortex (LF), but it can be observed in the right frontal cortex (RF). In 9-month olds, auditory discriminating activity is limited to long oddballs. Furthermore, the long oddball duration generates a different response to either the standard or short oddball (which are mostly indistinguishable) in both frontal cortices, but more pronounced and sustained in LF. The processing differences between 4- and 9-month-olds are discussed in the context of a developmental shift from subcortical to cortical control of behaviour (cf. Colombo & Richman, 2002) and the progressive contribution of frontal lobes to information processing.

B37 Teams Channel

B38 Does caregiver knowledge about child development predict domain-specific curiosity and learning outcomes?

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Specific epistemic curiosity represents one's desire to gain information about a particular topic (Berlyne, 1966; Loewenstein, 1994). Research shows that pre-existing knowledge predicts curiosity and that higher self-estimated curiosity is associated with better learning. However, prior experimental studies have primarily investigated relatively arbitrary and wide domains of knowledge (e.g., random trivia questions; Kang et al., 2009; Wade & Kidd, 2019). The present study aims to assess the relationship between curiosity, knowledge and learning in a topic-specific area, and to investigate their relationship with real-life, behavioural outcomes in addition to self-perceived estimates. We will survey infant caregivers who previously participated in developmental research lab studies, from whom both self-reported and standardised measures of knowledge and curiosity about child development will be collected, including their visitation history to the Babylab. To measure behavioural curiosity and learning outcomes, a novel exploratory reading task will be developed. In the Curiosity phase of this task, participants will be presented with nine possible "windows", each containing a title of a short layperson-style article about developmental psychology research study. Clicking a window will display the actual article. Participants will be free to read as many articles as they want, but it will be emphasised that they are under no obligation to do so and may to quit the task at any time. The number of articles accessed and the elapsed reading time will be recorded as behavioural measures of curiosity. Next, the Retention phase will consist of a surprise recall task, with several questions about the information contained in the read articles used as a measure of participants' domain-specific learning. The results of this study will inform whether pre-existing topic-specific knowledge positively predicts specific epistemic curiosity and learning outcomes. Additionally, the present study will clarify the relationship between self-reported and behavioural measures of knowledge and curiosity.

B38 Teams Channel

B39 Polish adaptation of the Early Motor Questionnaire (EMQ): an exploration of predictors of parent-reported motor development

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The Early Motor Questionnaire (Libertus & Landa, 2013) is a parent-report measure of motor development for infants aged 2-24 months, with three subscales: gross motor (GM), fine motor (FM), and perception-action integration (PA) skills. Here we present the results of the online study using the Polish version of the EMQ. Over 700 caregivers completed the EMQ and additional demographic questions (ongoing data collection and analysis). Only typically developing infants were included in the analysis (born full-term, without elevated ASD likelihood, birthweight 2500-4500g). The Polish EMQ had good internal consistency (Cronbach's alphas: Total Score: 0.988, GM: 0.977, FM: 0.959, PA: 0.961). Furthermore, infants' age positively correlated with scores from all subscales (GM: $r = .921$, FM: $r = .925$, PA: $r = .928$). There was no correlation between birth weight and any of the scores (all $ps > .56$). We have not found any sex differences in any of the subscales (one-way ANOVAs, all $ps > .23$). Our results showed that typically developing infants that participated in physical therapy had significantly lower GM scores (M = 152.78, SD = 50.39) compared to those that did not (M = 163.22, SD = 52.86), one-way ANOVA, $F(1,639)=5.56$, $p < .02$. The effect of participation in paediatric physical therapy was specific to gross motor skills, which suggests that this subscale may be a sensitive tool to identify early motor problems.

B39 Teams Channel

B40 Response to illusory audiovisual speech perception in the right frontal brain area is specific to upright but not inverted faces only from 9 months of age

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Infants can acquire language easily, and even though it is an auditory domain, articulating lips can be an additional asset during the learning process. The McGurk illusion (McGurk & MacDonald, 1976) is a phenomenon in which seeing non-matching lip articulation interferes with the perception of a speech sound. That effect was previously used in infant studies and showed that infantile P2 can be found in response to illusory audiovisual speech percept over frontal leads between 140 and 240 ms from the sound onset (Kushnerenko et.al., 2007). During the first year of life, differential neural processing of upright and inverted faces emerges as well (de Haan et al., 2002), showing gradual upright face specialisation. This study aimed to investigate the impact of face orientation in audio-visual (AV) speech perception task on infantile P2 response in two age groups. We measured high-density event-related potentials (ERPs) in 5- to 6-month-olds (n=16) and 9- to 10- month-olds (n=16) in response to videos of /ga/ articulation dubbed with audio matching /ga/ or mismatching /ba/ syllables, presented in upright and inverted orientations. Results replicated previous findings showing the P2 response in right fronto-central electrodes (Kushnerenko et.al., 2013), specific only to fusion condition in the upright orientation. However, this differential response was only detected in 9- to 10-month-olds (p<.05), while 5- to 6-month-olds did not have higher voltage amplitude in response to fusion upright condition in comparison to other ones. To our knowledge, it is the first study showing that response to the audiovisual stimulus, requiring integration of these two modalities, is specific only to the upright condition in older infants. These results suggest different processing of inverted McGurk illusion in infants, but only after 9 months of age, demonstrating again that P2 may have contributions from visual areas, besides its auditory nature.

B40 Teams Channel

B41 Do naps promote selective memory consolidation in the context of expectation violation in 6- and 11- month-old infants?

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Given the wealth of new information they encounter every day, infants face the challenge of selecting only some of this information for long-term retention. Sleep facilitates memory consolidation in infants (cf. Seehagen et al., 2019). Initial evidence suggests that sleep might preferentially support consolidation of memories that are perceived of future relevance (Konrad et al., 2019). The aim of the present study is to assess the effect of napping on selective consolidation of memories related to unexpected events. Six- and 11-month-old infants (final N = 68) will watch televised events with outcomes either agreeing with or violating physical principles (cf. Stahl & Feigenson, 2015). For example, infants will see an object seemingly pass through a solid wall (violation) or stop in front of the wall (agreement). After a 10-sec display of the event outcome, infants will view the target object moving in front of a coloured background, and hence receive the opportunity to learn this object-colour association. After a 24-hr delay, looking time proportions to the target relative to a distractor will be assessed in two trials, first by presenting objects stationary in front of a black background and second by including movement and coloured background. Retention of the association is inferred if looking time to the target object increases from first to second test trial (learning score). To assess the effect of naps, each infant will participate twice, once viewing events shortly before a naturally occurring nap, and once at the beginning of an extended period of wakefulness. Each infant will either view events that agree with, or events that violate physical principles on both occasions. Our key prediction is that post-encoding naps will selectively strengthen memories related to unexpected events, reflected in higher learning scores when napping after unexpected events than after expected events or when not napping.

B41 Teams Channel

B42 Mother-infant physiological synchrony and its role in language development

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Parent-infant synchrony is the "dynamic process by which hormonal, physiological, and behavioral cues are exchanged during social contact" (Feldman, 2012). The synchronization (i.e., coupling) of cardiac and respiratory patterns in mother-infant dyads emerges early in life supporting the development of infants' self-regulation (Feldman et al., 2007). Behavioral synchrony can result from parental attunement - the degree to which parents adapt their behavior to their children – which contributes to language outcomes (Topping et al., 2013; Nicely et al., 1999; van Bakel & Riksen-Walraven, 2008). However, little is known about the role of cardio-respiratory parental attunement on language development. A biomarker to examine parent-child self-regulation is respiratory sinus arrhythmia (RSA), where two consecutive heartbeats shorten during inspiration and prolong during expiration (Fuchs et al., 2021; Nguyen et al., 2021). One important precursor of lexical acquisition is speech segmentation (Junge et al., 2012). Here we examine whether and how mother-child physiological synchrony, measured by RSA synchrony, predicts early speech segmentation. We hypothesize that more frequent episodes of mother-child RSA synchrony will be associated with higher speech segmentation performance. We will test 90 German-speaking mothers and their 9-month-old infants; the current sample consists of 40 mother-infant dyads. In order to measure RSA synchrony, the mothers and their infants perform a 5-minutes free play while their cardiac activity is measured using dual-electrocardiogram. With an eye-tracking-based central fixation paradigm, we test infants' speech segmentation. During familiarization, infants hear text passages containing two target words (i.e., familiar words). At test, infants hear familiar words and novel words. Differences in looking times to novel and familiar words will suggest that infants recognize the words segmented during familiarization. We will apply intra-dyad dynamics modelling to examine within- and between-dyad RSA synchrony (Fuchs et al., 2021). We will then test whether looking time is moderated by RSA synchrony.

B42 Teams Channel

B43 Young children's exposure to and production of relative clauses: A corpus study of child-directed and child speech

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Previous research examining children's understanding of relative clauses (RCs) has shown that object RCs (e.g., the cat that the dog chased) are more difficult to process than subject RCs (e.g., the dog that chased the cat). Yet, traditional experiments often used isolated sentences, omitting the influence of discourse or limiting the study of discourse to the use of different noun phrase types (e.g., lexical noun phrase vs. pronouns). Yet, other research has shown that language learners are sensitive to the distributional frequencies of complex sentence structures and aspects of discourse. The few studies that have investigated the influence of discourse on language learners' processing of RCs have found that adults have specific discourse expectations for subject and object RCs (e.g., subject within an object RC tends to refer to discourse-old referent), and when preceded by appropriate discourse, object RCs were found to be no harder to process than subject RCs. The present study extends this line of work and studies RCs in child-directed and child speech through densely-collected English-speaking developmental corpus data (range = 2-5 years) from three different caregivers-child dyads. Part of this study is exploratory, in which we intend to gather distributional information on a range of morphosyntactic and discourse-level characteristics of the RCs in child-directed and child speech, generate frequencies on how different types of embedded noun phrase co-occur with different verbs and verb types, and examine the associations between different morphosyntactic and discourse-level variables, in particular whether and how the use of subject and object RCs in child-directed speech aligns with discourse. The confirmatory part of the study examines the morphosyntactic and discourse-level characteristics of different types of RCs in child-directed and child speech, compare how well distributional information of RCs in children's input correlates with that in their speech, and whether such patterns change developmentally.

B43 Teams Channel

B44 Assessing early verb comprehension in 10- and 14-month-olds: A proposed eye-tracking and event-related potential study

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Assessing what the early verb lexicon looks like is necessary for defining language development milestones. But when does verb understanding begin? When it comes to concrete nouns, comprehension starts as early as 6 months (Bergelson & Swingley, 2012). Indirect evidence suggests that infants may understand abstract words, such as verbs, from the age of 10 months. Although verb comprehension was not directly assessed, recent studies revealed that 10-month-olds comprehend some abstract words and associate common verbs with target objects (Bergelson & Swingley, 2013, Nomikou et al., 2019). Yet, the question of when infants first comprehend verbs remains open. The proposed study aims to investigate whether 10- and 14-month-old infants understand verbs using a novel combination of eye-tracking and event-related potential (ERP) tasks. During an eye-tracking paradigm, infants will see paired videos of actions being performed. Infants will hear one congruent verb during each trial, allowing us to assess verb comprehension by measuring relative looking time to the target stimulus versus the competitor (currently being piloted via Zoom). During a video-verb priming ERP paradigm, infants will be primed with a video depicting an action and probed with an action-congruent or incongruent auditory label. In this semantic-priming task, larger N400 amplitudes in response to incongruent pairings will be interpreted as an indicator of semantic word comprehension. If infants understand verbs, we predict they will: (1) fixate on named verb targets more often than would be expected by chance and (2) elicit greater N400 amplitudes to verbs incongruent, compared to congruent, with the action prime. By extending established techniques used to investigate noun comprehension, the present study will directly evaluate when infants begin understanding verbs, contributing to a broader understanding of language development in a noun-dominated literature.

B44 Teams Channel

B45 The relationship between explicit synchronised movement, displayed pro-social sharing and reported perceived similarity in children

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Previous research has shown that synchronous movement between individuals can heighten feelings of prosociality and similarity (e.g. Rabinowitch et al. 2015; Rabinowitch et al. 2017a, 2017b; Fehr et al. 2008). However, research using virtually-induced synchrony with children has not been studied. The current study explored the effect of virtually-induced motor synchrony, on prosocial generosity and perceived similarity in young children. This study used a 3x2x2 between-subjects design, with three independent variables [synchrony condition (3), gender (2), year group (2)] and two dependent variables [generosity and perceived similarity]. Eight-two 4.5- to 6.5-year-olds (40 girls) participated. Children tapped along on a drum with either 1) a same sex virtual peer bouncing a ball in a movie, or 2) a ball bouncing on its own. In a control condition, children watched a tiger playing with a ball and then drew a picture. . Generosity was measured using a toy distribution, a task in which the children had to allocate toys to themselves and the virtual peer (Rabinowithch & Meltzoff, 2017) Perceived Similarity was established based using on Rabinowitch and Knafo-Noam's (2014) similarity inventory. There were no significant effects of gender, age or condition on either generosity or perceived similarity. However, planned post-hoc tests revealed that children in the social synchrony condition (with the virtual peer) reported higher perceived similarity to their virtual peer than those in the non-social synchrony condition (the ball bouncing alone) - $t(54)=2.230$, $p<.03$. Also, pairwise comparison showed younger children (4.5-5.5) scored higher levels of similarity $F(1.70)=6.632$, $p<.012$. Results showed that virtually induced synchrony is not as useful in altering the generosity choice of young children (Rabonowitch et al. 2017). However, more interestingly, results indicated that children felt more similar to an unfamiliar peer following conscious movement synchrony.

B45 Teams Channel

B46 Sensory symptoms and early autism behaviours in infancy

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This study examines the relationship of sensory symptoms to early autism behaviors in 12-month-old infants from varying risk cohorts. Sensory symptoms refer to atypical behavioural responses to daily sensory stimuli in the environment. Responses can be described as hyper-reactive (sensitive or avoiding), hypo-reactive (poor registration) and/or as unusual sensory interests (seeking) and are commonly associated with childhood autism. Sensory symptoms are observable in infancy. There are few studies, however, examining which sensory symptoms in infancy are predictive of early autism behaviors. Infant participants (n=183) participated in one of three University of Newcastle BabyLab studies and were either: 1) babies born to mothers with asthma (n=67; mean age=12.68 months), 2) babies born preterm (n=42; mean corrected age=12.10 months) or 3) general population controls (n=57; mean age=12.32 months). Measures assessing general development (Bayley-III), sensory symptoms (Toddler Sensory Profile 2/TSP2 – parent-report; Test of Sensory Function in Infants/TSFI - observational) and early autism behaviors (First Year Inventory; FYI) were administered. Cognitive function for the entire cohort fell in the average range (mean Bayley Cognitive Composite =106.38, SD=12.0). Bayley Cognitive Composite score was negatively associated with FYI Total Risk score (r=-0.28, p=.001), TSP2 sensory sensitivity (r=-0.21, p=.007), and TSP2 sensory avoiding (r=-0.18, p=.02) indicating that higher cognitive function was associated with fewer early autism behaviors and fewer symptoms of sensory sensitivity and avoiding. Bayley Cognitive Composite score was also positively but weakly associated with TSFI Total (r=0.18, p=.05). FYI Total Risk was further associated with TSP2 sensory sensitivity (r=0.43, p=.001), TSP2 sensory avoiding (r=0.43, p=.001) and poor sensory registration (r=0.46, p=.001). FYI Total Risk was not, however, associated with number of days born early (r=0.03, p=.65), TSP2 seeking (r=0.07, p=.39) or TSFI Total (r=-0.09, p=.32). Poor sensory registration emerged as a significant, independent predictor for FYI Total Risk, adjusted R2 = 0.21, F(1,171)=47.47, p=.0001. Poor sensory registration as reported by parents was identified as a moderate level predictor of early autism behaviors at 12 months of age, independent of cognitive function and across high and low risk infant cohorts. Parent-reported sensory sensitivity was also associated with early autism risk, but its

contribution was more difficult to separate from infant cognition. Neither parent-reported sensory seeking behaviors nor observed sensory infant sensory function were associated with early autism behaviors at 12 months of age. The findings of this study provide support for the inclusion of sensory screening in early autism assessment. In particular, inclusion of opportunities for parents to report on infant sensory reactivity (either hyper- or hypo-reactivity) may enhance the identification of young children who are showing early autism behaviors that are amenable to targeted early intervention.

B46 Teams Channel

B47 Is it really language? The role of input salience in early categorization

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Infants detect commonalities between objects from as young as three months of age (Behl-Chadha, 1996; Eimas & Quinn, 1994) and language has been shown to play an important role in the process of categorizing objects and internalizing object relationships in infancy (e.g., Althaus & Westermann, 2016; Balaban & Waxman, 1997; Ferry et al., 2010). However, non-verbal cues such as actions and gestures are equally salient for infants (e.g., Özçalışkan & Goldin-Meadow, 2005; Rakison, 2005). In this study, we ask whether input salience assists category learning rather than language per se. We designed and pre-registered a study (https://osf.io/jc7kv/) to examine how words and arbitrary actions may shape categorization processes differently across the first two years in development. Based on looking times, we investigate infants' object categorization success at 12- and 24-months (n = 120) across three conditions (no-cue, word-cue, action-cue) using a novelty-preference-task. Power analyses were based on data showing that object functions and object names affect infant categorization at 14- and 18-months of age (Booth & Waxman, 2002) and revealed 90% power with a sample size of 20 participants per condition in each age group. We plan to proceed with data analyses when data collection is completed. During familiarization, we present infants with videos of single-category objects that vary in color and other perceptual features, either accompanied by a word, an action being performed on the object, or no additional cue. At test, infants see a novel object of the just-learned category and a novel object from an unknown category side-by-side on the screen. Increased observation of the latter at test is typically interpreted as evidence for category formation and generalization of the objects from the just-learned category. Systematic differences in the extent to which input influences early category formation will allow us to make assumptions about mechanisms underlying object extension processes at different points in early development.

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B48 Selective attention to a talker's mouth facilitates non-adjacent dependency learning in 15-month-old infants

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The acquisition of grammar requires the ability to learn non-adjacent dependencies. Behavioural studies have found that infants start tracking non-adjacent dependencies (NAD) between 15 and 18 months of age when they are tested with auditory-only speech stimuli (Santelmann & Jusczyk, 1998; Gómez & Maye, 2005). Importantly, however, infants often experience speech and language as an audiovisual event. Studies have found that (a) audiovisual speech is more perceptually salient because of its redundant specification in two modalities (Summerfield, 1979), (b) elicits greater attention to the source of audiovisual speech (i.e., the talker's mouth), (c) facilitates speech processing (Lewkowicz & Hansen-Tift, 2012; Pons, Bosch, & Lewkowicz, 2015; Schure, Junge, & Boersma, 2016; Teinonen, Aslin, Alku, & Csibra, 2008), and (d) infant attention to a talker's mouth facilitates language acquisition (Tenenbaum et al., 2015; Tsang, Atagi, & Johnson, 2018). Therefore, here we investigated whether 15-month-old infants' learning of non-adjacent dependencies might be facilitated by attention to a talker's mouth. To do so, we developed an audiovisual version of the auditory NAD learning task used by Gómez and Maye (2005). Using a Tobii eye-tracker, we recorded infants' looking to a female actor's eyes and mouth during an initial familiarization procedure, when she spoke an artificial language that followed an AXB structure (i.e., tis-X-bun; nal-X-gor) and then during a test phase when she spoke the same language or an unfamiliar one, containing a violation of the previous AXB structure (i.e., tis-X-gor; nal-X-bun). A comparison of overall attention during the familiar and novel test trials did not yield a significant difference. However, a linear mixed-model analysis of the time-course of infant attention to the talker's mouth revealed that infants exhibited a significant increase in attention to the mouth during novel-grammar test trials and a significant decrease in attention to the mouth during familiar-grammar test trials. Given that the most salient information specifying the NAD was located in the mouth, the differential patterns of mouth-looking provide statistically reliable evidence of discrimination. Overall, these results suggest that audiovisual redundancy facilitates infant learning of non-adjacent dependencies.

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B49 The interplay of prosodic and syntactic boundary cues in infants' speech segmentation

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An important prerequisite for language acquisition is the ability to segment the continuous speech stream into meaningful units. Infants during the first year of life show a high sensitivity for prosodic boundaries which often coincide with syntactic clause boundaries (e.g., Hirsh-Pasek et al. 1987). Prosodic boundaries usually consist of three boundary cues: a pre-boundary lengthening, a pre-boundary pitch rise, and a pause (henceforth called "well-formed" boundaries). Although we know that speech segmentation in older children and adults is increasingly influenced by lexical and syntactic knowledge (e.g., Männel et al., 2013), it is not yet clear how bottom-up perceptual processes (driven by prosodic boundary cues) and top-down knowledge-based processes (driven by lexical and syntactic knowledge) contribute to the early development of speech segmentation abilities. We plan to use pupillometry to determine whether and when infants rely solely on the perceptual well-formedness of prosodic cues to segment the speech stream, and at which age lexical and syntactic knowledge is integrated. We therefore plan to present naturally-recorded children's stories to different age groups (6-month-olds, 42-month-olds, adult controls) using a 2x2 within-subject design with the factors prosodic boundary cue (well-formed vs. ill-formed) and boundary position (syntactically expected vs. unexpected). Results of a naturalness rating study of the stimuli show the expected knowledge-based preference of adults: Sentences were rated as most natural when prosodic and syntactic boundary cues aligned, whereas sentences containing a boundary at a syntactically unexpected position were rated least natural, independent of prosodic well-formedness. We plan to present pupil data examining age-dependent differences in the interplay of these cues and their effect on speech segmentation processes: For 6-month-old infants, processing could be guided primarily by prosodic well-formedness independent of syntactic position. For 42-month-old children, however, more advanced lexical and syntactic knowledge could lead to an increased impact of the syntactic boundary position.

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