Lancaster University

9TH LANCASTER INTERNATIONAL CONFERENCE ON INFANT AND EARLY CHILD DEVELOPMENT

27-29 AUGUST 2025

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!

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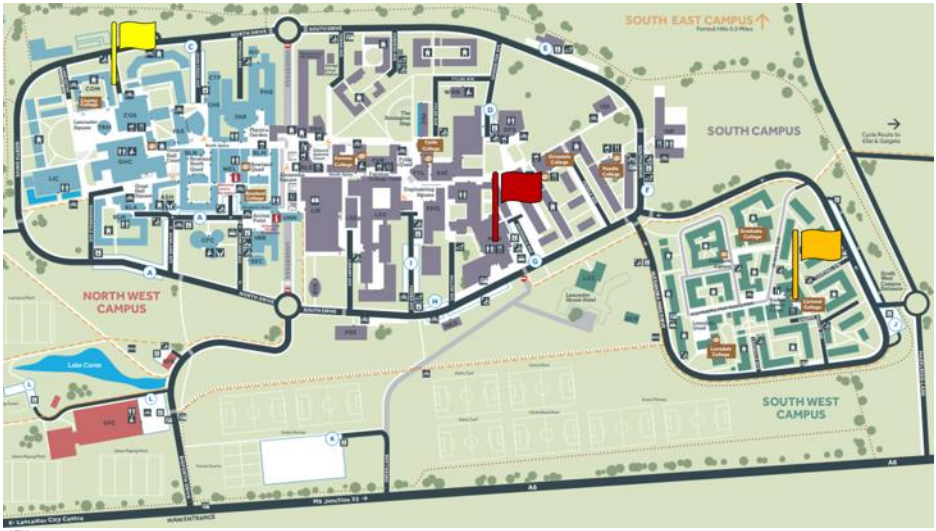
LOCATIONS

LCICD will take place on the Lancaster University Campus, in the **Management School** building. If you stay in town, you can comfortably reach the campus by bus to the 'Underpass' – From the underpass go up the stairs or in the lift. You will be facing costa coffee. Turn left until you see the left turn to the South Spine (between work in progress and the library). Walk down the south spine, past Fylde college and Engineering One. Turn right behind Engineering One, opposite the Science and Technology Building, you will see a left turn into the Management School. The registration desk will be available in the reception area.
https://what3words.com/insurance.convinced.broth



Management School Building.
University Print Shop
Gala Dinner at Barker House

You can also use Mazemap to find your way around campus. (QR-code on the right)

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WELCOME!

Dear LCICD 2025 attendees,

After taking a short break in 2024, we are delighted to welcome you to the 9th Lancaster Conference on Infant and Early Childhood Development. Thank you for joining us for what we believe will be a fantastic three days showcasing the latest cutting-edge research on infant and early childhood development.

We are pleased that once again, we have surpassed previous submission records with over 130 submissions this year. We were also able to again provide a number of hardship fund grants, in line with the spirit of inclusivity that we believe is a characteristic feature of LCICD.

It is our pleasure to host an event dedicated to research in infant and early childhood development. This is a place to share stories of success (and lessons learned!), ask questions, look for answers, and explore how the latest research findings are advancing our field. As every year, we hope you will enjoy your time and will come away from the conference with new ideas, good feedback on your work, new friendships, and happy memories.

Xiaoyun Chen, Gert Westermann
and the LCICD Organising Committee

SCHEDULE DAY 1

Wednesday, 27th August 2025

8:30 - 9:30	Registration
9:30 - 9:45	Welcome
09.45 - 10:45	Keynote 1: Diane Poulin-Dubois **Infants' insight into the mind: How deep?** *Moderator:* Gert Westermann
10:45 - 11:45	Talk session 1 *Moderator:* Eleanor Johns **Associations between caregiver-infant interactions and infant visual short-term memory** *Presenting author: Sobanawartiny Wijeakumar* **The Development of 'Hot' and 'Cool' Inhibitory Control from Infancy to Early Childhood** *Presenting author: Abigail Fiske*
11.45 - 12:15	Coffee Break
12.15 - 13:15	Talk session 2 *Moderator:* Abigail Fiske **Pre- and Postnatal Maternal Mentalizing and Infant Empathy at 6 and 15 months** *Presenting author: Daphna G. Dollberg* **Beyond the mean: Temporal dynamics of observed emotion responses are uniquely associated with parent-rated temperamental traits in infancy** *Presenting author: Zeynep M. Suata*
13.15 – 13.25	A brief introduction to our sponsor, NIRx

13.25 - 14:15	Lunch Break
14.15 - 15.45	Poster Session 1
15.45 - 16:15	Coffee Break
16.15 - 17.45	Talk Session 3 *Moderator:* Nicola Botting **The Role of Visual Processing in the Comprehension-Production Gap: Insights from Vocabulary Development in Williams Syndrome** *Presenting author: Julien Mayor* **Early selective attention to the mouth of a talking face in the first year of life as a potential female-specific marker of better language development in autism.** *Presenting author: Itziar Lozano* **A caregiver-led intervention to encourage vocalisations and facilitate word learning in children with Down syndrome** *Presenting author: Tamar Keren-Portnoy*
19.00 onwards	Conference dinner (Barker House Farm)

SCHEDULE DAY 2

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10.00 - 11.00	Talk session 4 *Moderator:* Teodora Gliga **In utero detection of early sensory brain responses via optically pumped magnetometers** *Presenting author: Chiara Capparini* **Investigating prenatal speech processing in foetuses** *Presenting author: Saniye Betul Teksin*
11.00 - 11.30	Coffee break
11.30 -13.00	Talk session 5 *Moderator:* Catherine Tamis-LeMonda **How Probabilistic and Biased is Action Planning Over Development?** *Presenting author: Arezoo Alford* **Development in Motion: Motor Competence and its Link to Cognitive and Social-emotional Functioning in Flemish Toddlers** *Presenting author: Lisa Mertens* **Infants as active explorers: motor burstiness and visual complexity in early development** *Presenting author: Dean D'Souza*
13.00 - 14.00	Lunch Break

14.00 - 15.30	Talk session 6 *Moderator:* Hiromichi Hagihara **A Longitudinal Analysis of Parents' Social Attention to Infants in the Home Environment** *Presenting author: Hiroki Yamamoto* **Nonlinear developmental changes in infants' exposure to faces during naturalistic playtime: Insights from head-mounted cameras and automated face detection** *Presenting author: Hana D'Souza* **Play by Play: Parent-Infant Moment-to Moment Interactions Generate Cohesive Knowledge Systems** *Presenting author: Hadar Karmazyn-Raz*
15.30 - 16.00	Coffee Break
16.00 - 17.00	Talk session 7 *Moderator:* Sylvain Sirois **Learning and graded responses to violation of expectation in infants' pupil dilation** *Presenting author: Paul Gallenkemper* **From Exposure to Expression – Linguistic and Racial Diversity Shapes Own- and Other-Race Face Recognition in the First Year of Life** *Presenting author: Ricarda Brieke*
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SCHEDULE DAY 3

Friday, 29th August 2025

8.30 - 9.00	Registration
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13.00 - 13.15	Awards and closing remarks
13.15 - 14.00	Tour of Infant and Child Development Lab

KEYNOTE SPEAKERS



How Behavior Develops

Karen E. Adolph
New York University

Behavior is everything we do. It is the outcome of—and provides the input for—multimodal exploration, perception, cognition, motivation, emotion, and social interaction. With age and experience, infant behavior becomes more flexible, adaptive, and functional. How does behavior develop? In the course of everyday activity, infants acquire immense amounts of time-distributed, variable, error-filled practice for every type of foundational behavior researchers have measured. Practice is largely spontaneous, self-motivated, and frequently not goal directed. Formal robot models suggest that infants' natural practice regimen—replete with variability and errors—is optimally suited for building a flexible behavioral system to respond adaptively to the constraints and opportunities of continually changing skills in an ever-changing world. I conclude with a proposal that open video sharing will speed progress toward understanding behavior and its development and improve clinical interventions and practice.

Infants' insight into the mind: How deep?

Diane Poulin-Dubois
Concordia University

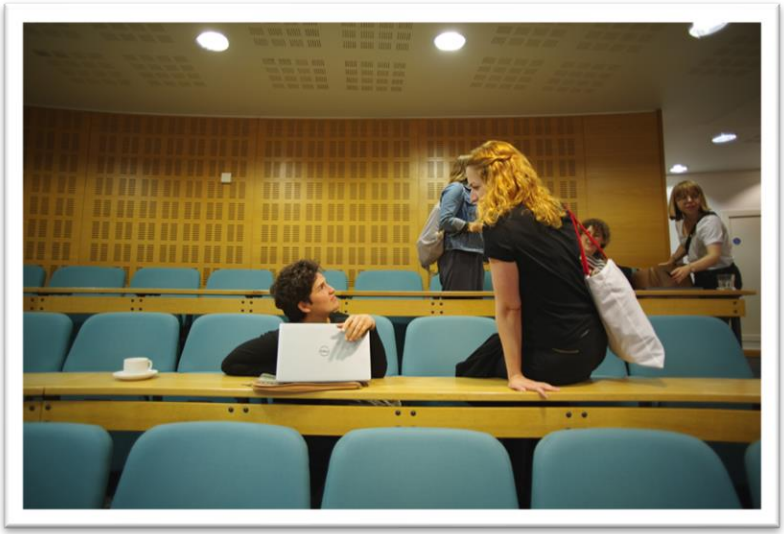
Theory of Mind is typically defined as the ability to understand the thoughts, beliefs, desires, and emotions of other people. For decades, researchers have been trying to find out whether the capacity for mentalizing is present in infancy. According to the mentalistic view, preverbal infants understand mental states such as false belief when the task demands (e.g, inhibitory control skills) are reduced. This perspective has recently been the subject of a number of critical reviews. In this talk, I will summarize the current state of the science on the depth of infants' mindreading skills. I will do so by reviewing recent findings from longitudinal studies on the stability of theory of mind from infancy to childhood, from recent strict and conceptual replications, and from neuroscience. Concerning the stability of theory of mind, results are conflicting, in part due to the poor psychometric properties of the implicit tasks available to test infants, such as the anticipatory looking and violation of expectation paradigms. I will discuss the results of strict replications, including those of a recent multi-lab project on infants' understanding of knowledge vs ignorance (ManyBabies2: Theory of mind in Infancy). Research in infant neuroscience has revealed that results mirror those obtained with adults to show that the temporo-parietal junction (TPJ) already displays some functional organization relevant to high-level social cognition by around 7 months of age. However, there is no link between such TPJ activation when infants are completing a false belief task (VOE) with performance on the standard theory of mind task years later. In my laboratory, a series of conceptual replications of the false belief task with the violation-of expectation paradigm has also revealed that a mature, full-fledged concept of false belief only develops gradually over the first few years of life. Finally, I will discuss which theoretical perspective on theory of mind development can best account for all these findings and propose future lines of research to make the research on theory of mind move forward.

Language learning starts in the womb: how prenatal experience lays the foundations for language acquisition

Judit Gervain
University of Padua

Hearing is operational from the 20-24th week of gestation. Infants thus encounter language for the first time while still in the womb. This talk will discuss a series of electroencephalography (EEG) and near-infrared spectroscopy (NIRS) studies showing how prenatal experience with language shapes newborn infants' speech perception abilities and their neural correlates. It will then argue that these prenatally shaped abilities scaffold and lay the foundations for subsequent language acquisition contributing to learning some of the most basic and foundational aspects of grammar such as basic word order by 8-9 months of life.

PAPER TALK ABSTRACTS



Session 1

Wed 27rd August, 10:45 - 11:45

Associations between caregiver-infant interactions and infant visual short-term memory

Sobanawartiny Wijeakumar and Aimee Theyer
University of Nottingham, Nottingham, United Kingdom

Previous research shows that infants' abilities to sustain attention is influenced by caregivers' attentional behaviours. However, little is known about brain function in either partner during these periods. The objective of the study was to examine brain function in infants and caregivers during critical attention periods in naturalistic interactions, and whether brain function during these periods was associated with infant visual short-term memory (VSTM). 90 caregivers and their 6-to-9-month-old infants were recorded for 7 minutes as they naturalistically played with objects. Video recordings were split into 5-second epochs and coded for look, touch, and verbalization/vocalizations in caregivers and infants. These epochs were used to define periods of caregiver-infant joint attention, and subsequent periods of continued attention in infants. Functional near-infrared spectroscopy was used to record brain data in both caregivers and infants. To assess VSTM in infants, a preferential looking task was used. In this task, two side-by-side flashing displays of colored shapes are presented. On the 'unchanging side', the colors of the shapes remain the same, while on the 'changing side', the color of one shape changes after each flash. Memory load was manipulated by changing the number of colored shapes between 1, 2 or 3 shapes. Infants' preference to the changing side i.e. a change preference score was extracted as an indication of infant VSTM abilities. Our findings revealed that longer duration of caregiver-infant joint attention was associated with longer duration of continued attention in infants. Further, during these interactions, caregivers and infants engaged the left superior temporal gyrus (lSTG), a region heavily implicated in perceiving and understanding behaviours in social partners. This region demonstrated profound caregiver-infant links, brain-behaviour links, and links to infant VSTM. Critically, caregivers who showed reduced lSTG activation also had infants who showed reduced lSTG activation, engaged in longer periods of joint attention with their infant, and had infants who showed longer periods of sustained attention and better VSTM abilities. These findings suggest greater suppression of the 'social mind' brain area in caregivers during dyadic interactions might be necessary to allow for better visual attention and cognition in infants both during naturalistic dyadic interactions, and during solo visual exploration during experimental settings. Our findings contribute to the understanding of cortical mechanisms engaged during caregiver-infant interactions, and importantly, how these mechanisms might be linked to visual cognition in infants.

The Development of 'Hot' and 'Cool' Inhibitory Control from Infancy to Early Childhood

Abigail Fiske[1,2], Alicia Mortimer[2,3], Rhiannon Bailey[2], Anna Hall[4], Katie Lui[2], Alexandra Hendry[2], Elizabeth Robson[5], Bethany Biggs[5], Henrik Dvergsdal[6], Gaia Scerif[2], and Karla Holmboe[5]

[1]Lancaster University, Lancaster, United Kingdom, [2]University of Oxford, Oxford, United Kingdom, [3]University of Maryland, College Park, MD, USA. [4]University College London, London, United Kingdom, [5]University of Bristol, Bristol, United Kingdom. [6]Nord University, Bodo, Norway

Inhibitory control – a core executive function – enables goal-directed control over thoughts, actions and behaviour. Simple forms of inhibitory control emerge already in infancy and become increasingly sophisticated into early childhood. Theoretical models distinguish "hot" inhibitory control, which operates in affectively or motivationally salient contexts (e.g., delay of gratification), and "cool" inhibitory control, which applies in affectively neutral contexts (e.g., response inhibition). Although some evidence suggests that these components follow distinct behavioural and neural trajectories, key questions remain about the structure, stability and progression of early inhibitory control skills in the first years of life. This gap largely reflects methodological challenges, including the need for age-appropriate tasks that can be used longitudinally and the difficulty of conducting studies that track early executive function development over time.

To address these challenges, we conducted a pre-registered longitudinal study examining the development of hot and cool inhibitory control from infancy to early childhood. The same cohort of participants was assessed at 10-months (N = 141), 16-months (N = 75) and 42-months of age (N = 93) using scalable or structurally comparable inhibitory control tasks. We hypothesised that (a) "hot" and "cool" inhibitory control would be significantly correlated within age, (b) inhibitory control performance would improve over time, and (c) longitudinal stability across infancy and early childhood would not be observed.

Results showed significant improvement on hot inhibitory control tasks from 10- to 16-months, with stable individual differences across this period. In contrast, there was no significant improvement or stability of cool inhibitory control from 10- to 16-months. These findings suggest that hot and cool inhibitory control follow distinct developmental trajectories across these early years. While no hot-cool associations were found in infancy, a weak association emerged at 3½ years, suggesting the beginning of convergence between these two facets of inhibitory control. We also found a preliminary longitudinal association between hot inhibitory control at 16-

months and cool inhibitory control at 3½ years, although this result did not survive correction for multiple comparisons and so requires replication. Overall, our findings hint at a reorganisation of inhibitory control across early development. These results provide novel insights into the early trajectories of inhibitory control and highlighting the dynamic nature of inhibitory control development in the first years of life.

Session 2

Wed 27rd August, 12:15 -13:15

Pre- and Postnatal Maternal Mentalizing and Infant Empathy at 6 and 15 months

Daphna G. Dollberg and Ronit Roth Hanania
The Academic College of Tel Aviv Yaffo, Tel Aviv, Israel

Maternal mentalization is a mother's ability to reflect on her infant's mind (Slade, 2005) and to mind and accurately infer the infant's thoughts and feelings (Meins et al., 2001). It is linked to positive child socio-emotional development. This study investigates maternal mentalization as a predictor of infant empathy, which is crucial for socio-emotional competence and relationships (Davidov et al., 2021).

Aim: To study the associations between maternal pre- and postnatal mentalizing and infant empathy at 6 and 15 months.

Hypotheses: 1) Maternal mentalization will correlate with infant empathy at both ages. (2) Prenatal mentalization will relate to postpartum mentalization. (3) Infant empathy at 6 months will predict empathy at 15 months. (4) Prenatal mentalization will, directly and indirectly, predict infant empathy at 15 months.

Sixty mother-infant dyads completed three phases of this longitudinal, multi-method study during COVID-19. Mothers' mentalizing was assessed repeatedly via self-report questionnaires (assessing reflective functioning), interviews (representational mind-mindedness), and free-play interactions (accurate mind-mindedness). Infants' empathy was measured by coding empathy-related behaviors to 60-second videos of a distressed baby and adult at six and 15 months.

Significant associations were found between pregnant mothers' reflective functioning, maternal postpartum accurate mind-mindedness, and infants' cognitive and emotional empathy at 6 months. Maternal prenatal reflective functioning and accurate mind-mindedness at 6 months were also associated with infants' 15-month cognitive and emotional empathy and prosocial behavior. Maternal mentalizing capacity was stable during the transition to motherhood such that mothers who were highly reflective and mind-minded during pregnancy continued to be highly reflective and mind-minded at 6 months. Infants who showed empathy towards another's distress when they were 6 months old were also empathic when they were 15 months old. Finally, prenatal mind-mindedness (B= -.74, SE=.36, $p<.05$) and accurate mentalizing at 6 months (B=5.60 SE=2.22, $p<.05$) uniquely and jointly predicted infant emotional empathy toward a

crying baby at 15 months (F (2, 39) = 5.05, p<.05). However, accurate mentalizing at 6 months did not mediate the link between prenatal mentalizing and infant empathy.

Mothers' prenatal and postnatal mentalizing is associated longitudinally with infants' expressions of empathy during the first and second years of life. These preliminary findings highlight the importance of early relationships in developing infants' concern for others.

Beyond the mean: Temporal dynamics of observed emotion responses are uniquely associated with parent-rated temperamental traits in infancy

Zeynep M. Suata[1,2], Kasia Kostyrka-Allchorne[3], Sam V. Wass[4], and Edmund Sonuga-Barke[2]

[1]Middle East Technical University, Ankara, Turkey, [2]King's College London, London, United Kingdom, [3]Queen Mary University of London, London, United Kingdom, [4]University of East London, London, United Kingdom

The recent shift in emphasis towards viewing emotions as temporal processes has given rise to various methodologies that aim to identify affect dynamics in pre-schoolers, adolescents, and adults. However, research examining similar affect dynamics in infant emotion reactivity and emotion regulation is limited. By studying not only the overall emotional response but also how variable and persistent that emotional response is over time, we can find richer and potentially more meaningful information that can better identify temperamental risk markers. To address this, we measured emotion reactivity and emotion regulation on a second-by-second basis during an emotion-evoking task (toy removal) at age 6 months (n = 82, 43 boys) and age 12 months (n = 68, 36 boys). The task included challenge (toy removed) and recovery (toy play) conditions. Following conventional practice, we initially calculated mean scores. Then, we identified three temporal dynamics: variability, indexed by variance; lability, indexed by root mean square successive differences; and persistency, indexed by autocorrelation. Parents rated their infants' temperament using the Infant Behaviour Questionnaire-Revised (IBQ-R) at both 6 and 12 months. To determine which emotion dynamic(s) were uniquely associated with temperamental characteristics, we computed a series of multiple regressions while accounting for the overlap between the mean and temporal dynamics in observed behaviours. More persistent, but not more intense (higher mean), negative reactivity during recovery at 6 months predicted higher parent-rated negative affect at the same age. More persistent and less variable emotion regulation during challenge was associated with increased duration of orienting on the IBQ-R at both ages 6 and 12 months,

but average levels of regulation were not. This study provides the first empirical support that temporal features of observed emotion reactivity and regulation during lab-based behavioural tasks could better associate with parent-rated temperament, and that these temporal affect dynamics potentially index stronger predictors than the mean level for transdiagnostic markers of temperament in infancy.

Session 3

Wed 27rd August, 16:15 - 17:45

The Role of Visual Processing in the Comprehension-Production Gap: Insights from Vocabulary Development in Williams Syndrome

Dean D'Souza[1], Hana D'Souza[1], Julien Mayor[2], and Angel Tovar[3]
[1]Cardiff University, Cardiff, United Kingdom, [2]University of Oslo, Oslo, Norway, [3]Universidad Autonoma de Mexico, Mexico City, Mexico

The comprehension-production gap is a widely documented hallmark of language development, yet this asymmetry is notably reduced in children with Williams syndrome (WS), sometimes appearing as a relative advantage in production. Here, we combine empirical data with computational modelling to investigate potential mechanisms underlying this distinctive linguistic profile, focusing on children aged 7 months to 6 years.

Using parental reports (Communicative Development Inventories), we measured the receptive and expressive vocabularies of children with WS (n=67) and compared them to typically developing children (n=1210) and cross-syndrome groups with Down syndrome (n=27) and fragile X syndrome (n=15). Results confirm that children with WS show a unique trajectory: alongside general delay, they exhibit a reduced comprehension-production asymmetry not observed in other groups.

To elucidate the potential origins of this phenomenon, we implemented a biologically inspired neural network—self-organising map (SOM)—to model early word learning and evaluate visual and auditory map representations. Our findings reveal that WS-like vocabulary patterns emerge from selective difficulties in visual processing, leading to exemplar-based rather than prototype-based object representations. These visual processing challenges, consistent with known visuospatial difficulties in WS, explain the atypical comprehension-production relationship, while broader processing challenges contribute to general delays.

This study provides a mechanistic account of vocabulary development in WS, highlighting the role of visual constraints in shaping lexical outcomes. More broadly, it underscores the need to conceptualise language development as an interaction between sensory and cognitive subsystems, explaining why the comprehension-production gap is not a uniform feature of language acquisition.

Early selective attention to the mouth of a talking face in the first year of life as a potential female-specific marker of better language development in autism

Itziar Lozano[1,2], Anna Duszyk-Bogorodzka[3], Elena Capelli[4], Charlotte Viktorsson[2], Emily JH Jones[5], Przemysław Tomalski[1], Teodora Gliga[6]*, and Valentina Riva[4]*
** Shared senior co-authorship*
[1]Polish Academy of Sciences, Warsaw, Poland, [2]Uppsala University, Uppsala, Sweden, [3]SWPS University of Social Sciences and Humanities, Warsaw, Poland, [4]Scientific Institute IRCCS E. Medea, Child Psychopathology Unit, Lecco, Italy, [5]Centre for Brain and Cognitive Development, Birkbeck, University of London, London, United Kingdom, [6]University of East Anglia, Norwich, United Kingdom

Autism-related language differences are markedly less common in females than males (Harrop et al., 2021). However, the underlying developmental mechanisms remain unclear. In neurotypical infants, selective attention to the mouth of talking faces partially explains existing sex differences in language development. Female infants show more mouth-looking than males (Lozano et al., 2022); only for females, lower mouth-looking at 5.5 months predicts later larger vocabulary, suggesting it may act as a female-specific early marker for language development.

We investigate whether mouth-looking might also serve as an early, female-specific marker for language development in infants at elevated likelihood for autism. We hypothesized: (H1) female infants will show increased mouth-looking in the first year, regardless of autism likelihood; (H2) mouth-looking in infancy will predict better language development only in females (pre-registered: https://osf.io/f27me/?view_only=a5682a3605f14a4bb97e0d91979fe33d).

Using audiovisual syllables, we assessed sex differences in mouth-looking in infants with elevated (EL-infants; n = 58) and typical likelihood for autism (TL-infants; n = 65) (47.9% females) at 6, 9, and 12 months (collapsed), and its relation to parent-reported vocabulary skills at 12 and 24 months. Though this multisite project will reanalyze several longitudinal datasets (CBCD, UK; DiVE Lab, Sweden), we report only on the Italian cohort (MEDEA Babylab).

Linear mixed models revealed a significant sex by autism likelihood interaction ($p = .03$). Female TL-infants showed greater mouth-looking than male TL-infants ($p = .003$), while no sex differences were found in EL-infants. Additionally, female TL-infants looked more at the mouth than female EL-infants ($p = .02$), while male TL- and EL-infants did not differ.

In females only, mouth-looking in the first year was associated with expressive and receptive vocabulary at 12 months. Interestingly, autism likelihood modulated these

associations in opposite directions: as in Lozano et al. (2022), in female TL-infants, reduced mouth-looking correlated with larger expressive (p = .03) and receptive vocabulary (p = .009) while, in female EL-infants, increased mouth-looking associated to larger expressive (p = .004) and receptive vocabulary (p = .01). No other significant associations were found.

Our preliminary results suggest that both sex and autism likelihood influence early mouth-looking. Sex drives mouth-looking only in TL-infants, while autism likelihood influences it only in females. Early mouth-looking could serve as a female-specific marker for better language development in both neurotypical and elevated-likelihood populations. This could guide sex-specific early language interventions. We will discuss the still unclear mechanisms underlying these complex pathways (Lozano et al., 2025).

A caregiver-led intervention to encourage vocalisations and facilitate word learning in children with Down syndrome

Tamar Keren-Portnoy[1], Laura Boundy[1], Sue Buckley[2], Kelly Burgoyne[3], Helena Daffern[1], Mona Kanaan[1], and Arshad Sab[1]
[1]University of York, York, United Kingdom, [2]Down Syndrome Education International, Kirkby Lonsdale, United Kingdom, [3]University of Manchester, Manchester, United Kingdom

For typically developing infants, earlier babbling correlates with earlier word production (McGillion et al., 2016). Infants with Down syndrome (DS) are not very vocal (Parikh & Mastergorge, 2018) and are at risk for language delay (Zampini & D'Odorico, 2013). Encouragingly, Yoder et al. (2014) found that promoting vocalising in infants with DS may lead to earlier word production. We are testing a novel caregiver-led intervention intended to encourage more vocalising in infants with DS, using the BabblePlay app (Daffern et al., 2020). The app responds to infants' vocalising with moving shapes displayed on a screen.

In a pilot study, 26 infants with DS aged 7-15 months played with a mirror one week and with BabblePlay the following week. Infants vocalised at a higher rate per minute with BabblePlay (M=4.99) than with the mirror (M=3.38), p = 0.025 (signed-rank test). Parents reported limited accessibility to Speech and Language Therapy provision for infants with DS in the UK. Therefore, if successful, this intervention may fulfil a real need.

In addition to the pilot, we will also report on findings from an ongoing Feasibility Randomised Controlled Trial of the intervention (Boundy et al., 2024), data from which will be available by the time of the conference.

Session 4

Thu 28th August, 10:00 - 11:00

In utero detection of early sensory brain responses via optically pumped magnetometers

Chiara Capparini[1], Pierre Corvilain[1,2], Vincent Wens[1], Zachary Langford[1], Maxime Ferez[1], Xavier De Tiège[1], and Julie Bertels[1]

[1]Université libre de Bruxelles, Bruxelles, Belgium, [2]Children's Hospital Los Angeles, Los Angeles, USA

In the last trimester of pregnancy, the human fetus already exhibits a remarkable ability to detect and process external sensory inputs, including sound and light. Investigating the neural basis of this fetal perceptual ability has traditionally relied on cryogenic magnetoencephalography (MEG), a technique suited to non-invasively measure brain activity through the maternal womb. However, the widespread adoption of fetal MEG has been hindered by the high cost, logistical complexity, and scarcity of cryogenic systems suited to pregnant participants, which remain confined to a couple of specialized research centres worldwide.

In this work, we introduced a new cryogen-free MEG system based on optically pumped magnetometers (OPM-MEG) that can be adapted to both fetal and infant populations. The OPM sensors are lightweight and wearable, making them an ideal candidate for flexible and scalable MEG applications. The aim of the present work was to demonstrate the possibility to record brain activity in response to sensory stimulation already in utero adopting this wearable OPM-MEG solution. For the fetal recording, OPM sensors were organized into an adaptable abdominal belt. We recorded fetal brain activity in response to auditory stimuli (500 Hz tones) in a group of 21 pregnant participants in their late third trimester (35-40 weeks of gestation). The same auditory paradigm was also conducted with on-scalp OPM-MEG with a subgroup of participants who came back with their 1-month-old newborn. Our results demonstrated that OPM-MEG can successfully detect fetal auditory evoked responses, with group-level signals peaking around 300 ms post-stimulus onset. In newborns, responses to auditory stimuli appeared with shorter latencies in magnetometer data compared to the fetal group, suggesting postnatal maturation of auditory processing. In a further study, we are also recording fetal brain activity in response to visual stimulation (500 ms flashes of red light) in a group of pregnant women in their third trimester (32-36 weeks of gestation). Visual stimuli are presented in two locations over the maternal abdomen, according to the fetal head position and orientation. Data collection for this latter paradigm is currently ongoing, and these additional results will be presented at the conference.

The findings from the fetal and newborn OPM-MEG acquisitions establish the feasibility of this novel MEG approach to record brain responses to sensory stimuli already before birth. By enabling non-invasive and scalable studies across the prenatal and perinatal period, OPM-MEG holds a promise as a lifespan-compliant neuroimaging tool for tracking neural development from the womb onwards.

Investigating prenatal speech processing in foetuses

Saniye Betul Teksin, Kirsty Dunn, and Calum Hartley
Lancaster University, Lancaster, United Kingdom

When talking to babies, adults often use infant-directed speech (IDS) characterized by altered linguistic patterns and prosody. Neonates can discriminate between IDS and adult-directed speech (ADS) and prefer listening to IDS, suggesting a genetic basis for IDS (Kaplan et al., 1996). Given newborn babies' lack of environmental experience, such findings are often interpreted as evidence that speech preferences are genetically innate (Cooper & Aslin, 1990). However, genetic explanations for IDS overlook prenatal environmental influences. Here, we investigate to what extent IDS sensitivity is predicted by maternal stress in foetuses. Foetuses at 32-34 weeks' gestation will be exposed to IDS, backwards IDS (B-IDS), and ADS; currently, data from 75 participants have been collected. Discrimination of speech conditions will be indexed using foetal heart rate and behavioural measures using 4D ultrasound. Maternal emotional experiences will be measured using Dispositional Positive Emotion Scale (DPES), Positive and Negative Affection Scale (PANAS), Perceived Stress Scale (PSS). We predict that foetuses will show greater arousal in response to unfamiliar language (B-IDS) compared to IDS and ADS, demonstrating an ability to discriminate the linguistic components and prosody of speech in the womb. We also anticipate that foetuses of mums with greater maternal stress will show smaller differences in sensitivity to changes in speech conditions. Hypotheses were tested using linear mixed regression modelling conducted in R Studio. Our preliminary analysis with 68 participants shows the main effect of time ($p<.0001$) and condition ($p<.0001$) as well as interaction effect of time and condition ($p<01$). Foetuses show greater arousal to B-IDS compared to IDS and ADS. Additionally, we found significant time and Perceived Stress Scores interaction effects on ADS and B-IDS ($p<0001$). Furthermore, we found significant time and Positive PANAS interaction effects on IDS ($p <.02$*) and B-IDS ($p<0001$). The emotion data indicate that the maternal emotional environment may interact with prenatal speech processing, possibly suggesting that foetuses are responsive to both speech and emotional environment. Our results are important to show the potential roles of genetics and the prenatal environment on the development of preferences for infant directed speech.

Session 5

Thu 28th August, 11:30 - 13:00

How Probabilistic and Biased is Action Planning Over Development?

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Humans have remarkable abilities to plan actions flexibly. This sensorimotor skill is achieved by keeping the initial contacts objects and end goals in mind, even when these stretch far into the future. Action planning begins in infancy and improves with age and experience. However, children show deficits in planning when end goals are not immediately accessible to perception.

Here, we tested how these deficits relate to the biased and probabilistic nature of action planning. Children aged three-to-five years (N=40) and adults (N=28) completed two tasks: pounding a peg using a hammerhead and poking a button using a hammer's handle. Using a novel psychophysics procedure, we varied the hammer's orientation and goal, requiring participants to incorporate both into their initial-grip planning. For example, the peg task requires a radial grip for end-state comfort, thus a non-habitual underhand grip when the handle points away from the dominant hand. In contrast, the button task requires an ulnar grip for end-state comfort, thus an underhand grip when the handle points toward the dominant hand.

Throughout the task, eye-tracking, EEG, motion-tracking and video recordings captured the cascade from perception to cognition to action. We extracted individual psychophysical functions that quantified the angle at which participants switched from overhand to underhand grip (PSE) and the slope of the S-curve, reflecting the sharpness of this transition. For the peg task, children showed more gradual and variable transitions (PSE=127°, Slope=44°) indicating inconsistent and unrefined planning compared to adults (PSE=105°, Slope=62°). For the button task, adults tended to adopt one of three different grip strategies, each eliciting a wholly different curve: a) a negative slope (N=16, PSE=33°, Slope=-36°), b) a positive slope (N=5, PSE=94°, Slope=28°), or c) no slope (N=5; PSE outside the detectable range). Meanwhile, all children except one consistently adopted the positive-slope strategy, albeit with a stronger bias toward overhand grips (N=21, PSE=134°, Slope=33°). Grip choice was probabilistic – participants did not consistently select the same grip for the same angle and goal – and showed a bias towards habitual overhand grasping. Planning was less probabilistic for less-ambiguous angles (toward 0° or 180°) and depended on the goal.

Findings suggest that strategies for action planning for unfamiliar tasks have yet to manifest in three-to-five year olds. Although strategies can manifest differently for individuals, they become intransigent by adulthood. When task conditions are ambiguous, and planning therefore more difficult, humans fall back on habitual actions.

Development in Motion: Motor Competence and its Link to Cognitive and Social-emotional Functioning in Flemish Toddlers

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Motor competence (MC) is an indispensable part of child development. Despite a decline in MC among school-aged children (Bolger et al., 2021), the toddler age group remains understudied. This study aimed (1) to determine how total, gross, and fine MC of the studied sample of Flemish toddlers (1-3 years) compares to normative values, and (2) to investigate the relationship between these toddlers' total, gross and fine MC and their cognitive functioning (CF) and socio-emotional functioning (SEF).

A total of 268 toddlers were recruited to participate in this study through stratified cluster sampling within group daycare centres of 'HELAN Kinderopvang'. Their total, gross and fine MC was assessed using the Peabody Developmental Motor Scales, 2nd edition (PDMS-2; Folio & Fewell, 2000), while their CF was evaluated using the cognitive subtest of the Bayley Scales of Infant and Toddler Development, 4th edition (Bayley-4; Bayley, 2019). To determine SEF, the social-emotional parental questionnaire of the Bayley-4 (Bayley, 2019) was administered in a subsample of 97 toddlers.

One-sample Wilcoxon signed-rank tests demonstrated that our study sample's median total MC and median gross MC were significantly different from that of the PDMS-2 reference sample, with moderate ($Z = -7.554$; $p < .001$; $r = -0.491$) and strong effect sizes ($Z = -9.914$; $p < .001$; $r = -.632$), respectively (Bartz, 1999). Toddlers' median fine MC did not differ from the PDMS-2 median ($Z = 1.517$; $p = .129$; $r = .097$). Chi-square goodness-of-fit tests revealed significant deviations from the expected distributions (all $p < .001$) for total ($\chi^2(3) = 97.769$), gross ($\chi^2(3) = 87.048$), and fine MC ($\chi^2(3) = 108.304$). Furthermore, total, gross and fine MC all showed a significant weak positive relationship with toddlers' CF ($\rho = .286–.370$, all $p < .001$), but not with their SEF ($\rho = .116–.176$; all $p > .100$).

Flemish toddlers demonstrated a lower median total and gross MC compared to the original PDMS-2 normative sample, characterised by a shift mainly from the highest — but also from the lowest — performing categories towards the average level. Toddlers with lower MC scores were also more likely to have lower CF scores. Our findings suggest that the secular decline in (gross) MC observed in school-aged children is already apparent at toddler age. This study highlights the need for targeted initiatives to support MC from early childhood onwards, taking into account its interaction with other developmental domains.

Infants as active explorers: motor burstiness and visual complexity in early development

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Infants actively shape their own development by selecting and engaging with their environment. As their motor abilities progress and their exploratory behaviours become more complex, they may construct more varied and maybe even more visually complex views for themselves. To investigate this, we recorded the visual scenes available to 2- to 30-month-old children in their natural home environments using head-mounted cameras. Exploratory behaviour was quantified using a measure of burstiness—clusters of high activity interspersed with inactivity—capturing patterns ranging from periodic, through random, to maximal burstiness. Visual complexity was modelled using a deep convolutional neural network trained to predict perceived complexity ratings (Nagle & Lavie, 2020), outperforming feature-based models used in the literature. To evaluate nonlinear age-related changes, generalized additive models were applied. Results revealed that both exploratory activity ($p < .001$) and variability in visual complexity ($p = .014$) increase significantly from 2 months until walking age (around 10 months). Intriguingly, infants and toddlers experienced higher visual complexity than would be expected from the background alone ($p < .001$), indicating that from an early age, they actively select and engage with visually complex environments. These findings underscore that infants are not passive recipients of their surroundings but active architects of their own developmental trajectories.

Session 6

Thu 28th August, 14:00-15:30

A Longitudinal Analysis of Parents' Social Attention to Infants in the Home Environment

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During the first two years after birth, infants transition from being highly dependent on the caregivers to being more independent and pursuing their own activities. Although considerable research shows that parent-infant interactions play a crucial role in supporting infant development, little is known about how parent behaviors change with respect to the increasing independence of their infants. As a first step to answering this question, we collected longitudinal data in the home every other week during the period 10 to 15 months after birth, a period of increasing autonomy in toddlers' interactions with the world. Using head-mounted eye-trackers worn by parents, we recorded daily scenes from the parent-perspective of eight infant-parent dyads. Our focus was on parents' attention to the faces and hands of infants, which provides information to the parent about the infant's momentary interests. We conducted two types of analyses. The first analysis examined developmental changes in the contents of parent-perspective scenes. We compared the proportion of infants' hands, faces, and ongoing actions by the hands (i.e., hand on objects) or face (i.e., face looking back) between younger (10-12 months) and older infants (13-15 months). The second analysis examined developmental changes in the likelihood of parents' gaze on the infants' faces or hands. We tested whether caregivers were more or less likely to look at the infants' faces or hands depending on the infants' age and their ongoing actions.

Regarding the contents in parent-perspective scenes, there were no developmental changes in the proportion of infants' hands, faces, hands on objects, and faces looking back. However, we found developmental changes in the likelihood of parents' gaze on infants' faces and hands. Regarding parents' gaze on infants' faces, parents were less likely to look at older infants' faces than younger infants' faces, whether or not the infants looked back at the parents. Regarding parents' gaze on infants' hands, parents were less likely to look at older infants' hands than younger infants' hands, but only when infants' hands were not on objects. When the infants' hands were on objects,

the likelihood of parents' gaze on the infants' hands were comparable for younger and older infants. These findings suggest that parents' attention to their infants decreases overall during a period of increased infant autonomy, and that even within this trend, the infant's hand movements with objects is an event to which caregivers consistently direct their attention.

Nonlinear developmental changes in infants' exposure to faces during naturalistic playtime: Insights from head-mounted cameras and automated face detection

Teodor Nikolov and Hana D'Souza
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Infants' exposure to faces provides crucial input for early development. This study leverages innovations in wearable head-mounted cameras (headcams; specifically, TinyExplorer gear) and automated face detection (RetinaFace) to characterise infants' everyday visual exposure to faces during playtime in the home environment. Using a cross-sectional developmental trajectory design, we collected egocentric headcam data from 29 infants across the first three years of life (2-30 months). The dataset comprised 1,891 minutes of video (over 5.5 million frames). We examined developmental trajectories in face availability, spatial distribution, size, and size variability.

We observed distinct nonlinear changes in face exposure across three visual scene regions (bottom/middle/top). In early infancy, faces were most common in the middle, with a steep decline around 8 months and a modest increase after the first year. In the top region, face presence increased markedly during the second year. The bottom region consistently showed low face presence. These findings suggest that infants' exposure to faces is not only age-dependent but also region-specific, reflecting dynamic reorganisation of everyday visual input. Additionally, face size variability was greater in younger infants, consistent with caregiver-driven interactions. We interpret these findings in the context of emerging motor milestones.

By focusing on a constrained activity (playtime), this study demonstrates how nuanced developmental patterns can be detected using shorter recordings than in previous studies—improving scalability and inclusivity of naturalistic research. These results offer new insights into early face exposure and support the value of integrating ecological methods with automated analysis to advance developmental theory.

Play by Play: Parent-Infant Moment-to Moment Interactions Generate Cohesive Knowledge Systems

Hadar Karmazyn-Raz and Linda Smith
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Infant cognitive development emerges in the flow of daily social activities. These activities -mealtime, getting dressed, play -are contextually bound, time extended, and shaped by the moment-to-moment behaviors of the infant and the mature social partner(s). We analyzed the time series of parents and their infants (11–18-month-olds) toy-object handling during free play, revealing scale-invariant statistical properties: each action influences short-and long-term behavioral outcomes. A network analysis of the toy-object handling suggests that the temporal dynamics of parent and infant behaviors create higher-order meaning through predictive associations among play targets. Over four days of repeated free-play, infants and parents co-construct a coherent knowledge system, where unique meanings emerge within and across play episodes. We propose a memory model toexplain how these moment-to-moment behaviors generate cohesive knowledge systems. This model frames infant behavior as a complex system, where individual events carry immediate and enduring consequences, fostering knowledge formation and its in-context activation. Active environmental sampling by the infant engages fundamental memory mechanisms, producing optimal datasets for learning. These findings underscore the role of social and object play in early cognitive development, highlighting how predictive relations and knowledge systems arise from self-organized, dynamic interactions between infants and their social partners.

Session 7

Thu 28th August, 16:00 - 17:00

Learning and graded responses to violation of expectation in infants' pupil dilation

Paul Gallenkemper, Nina-Alisa Kollakowski, and Ulf Liszkowski
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Infants build expectations about repeated stimuli and show signs of surprise when their expectations are violated. While this is established using looking times, less is known about other psychophysiological correlates of violation of expectation (VoE) and learning, such as pupil dilation. One question is whether the amplitude of infants' pupil dilation responses (PDR) is related to the degree of violation (Tamási et al., 2017; Preuschoff et al., 2011). The surprise response could also be related to the rate of exposure during learning (Schöner & Thelen, 2009; Raz et al., 2023). A second question is whether infant's pupil responses decrease during learning (Marois et al., 2018; Polzer et al., 2023).

In this talk, I present findings from two studies in different domains, each with a preregistered series of experiments investigating infants' graded pupil responses to different degrees of expectancy violation, and during different durations of learning exposure.

In Study 1 on spatio-temporal learning, infants viewed a stimulus appearing in one location on a circle repeatedly and were tested with the stimulus reappearing at the same location, 90° or 180° away. In a first Experiment 1.1 (N = 48; age = 12m; learning trials = 4), there were no significant VoE effects in the PDR ($\beta180 = 0.006$, $p = .838$; $\beta90 = 0.01$, $p = .613$). There was no decrease in PDR over learning ($\beta = 0.03$, $p < .001$). In a second Experiment 1.2 we are administering 8 learning trials
(data collection expected to end by June, 2025;
https://osf.io/dqzhu/?view_only=eaff5f56411c42fb8f964d6746e5f103).

In Study 2 on learning object identities and categories, infants viewed either a single object repeatedly or multiple objects from the same category before we tested them with novel objects from the same or a different category. In Experiment 2.1 (N = 47; age = 14m; learning trials = 6), we found pupillometric VoE effects to different category objects ($\beta different = 0.1$, $p = .004$), but no graded PDR between test events ($\beta same = -0.14$, $p < .001$). There was no significant decrease in PDR over learning ($\beta = -0.016$, $p = .118$). In a second Experiment 2.2, we increased the number of learning trials to 8
(data collection expected to end by June, 2025;
https://osf.io/w7pse/?view_only=438d1528c9a044629b1080149cdf5a7d).

These studies provide a novel perspective on infants' graded responses to violations of expectation, moving beyond static VoE effects of looking times, and unraveling neurophysiological correlates with the continuous measure of pupil dilation.

From Exposure to Expression – Linguistic and Racial Diversity Shapes Own- and Other-Race Face Recognition in the First Year of Life

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People are better at recognizing faces from their own racial group than faces from other racial groups– a finding known as the Other-Race Effect (ORE). The ORE emerges in the first year of life: While infants become increasingly sophisticated at processing frequently experienced stimuli (e.g. native speech sounds, own-race faces), their sensitivity to less frequently experienced stimuli (e.g. nonnative speech sounds, other-race faces) declines. By 9 months of age, infants fail to discriminate faces outside their own (or most familiar) racial group. Although the ORE is widely attributed to early asymmetries in face exposure, surprisingly little research has directly investigated how variation in exposure shapes face perception. Most developmental work has focused on infants with relatively uniform experiences including predominant exposure to a single-race face category and a single native language. Yet, emerging evidence suggests that diverse face and language exposure may alter face perception in early development. We present three studies investigating how early exposure to linguistic and racial diversity influence own- and other-race face identity and emotion recognition. Study 1 tests 9-month-old monolingual and bilingual, predominantly White infants from the greater London area on a face recognition task featuring own- (White) and other-race (East-Asian) faces. Study 2 uses a novel face-morphing paradigm to measure perceptual sensitivity to own- and other-race face contrasts in 9-month-old monoracial and biracial infants raised in the American South. Stimuli include White, Black and East-Asian faces. Study 3 examines 9- and 18-month-old monoracial and biracial infants from the same region in an emotion discrimination task with fearful and happy faces. Across all studies, we assess recognition ability as well as selective attention to facial features during habituation and test phases. We collect detailed caregiver reports on infants' face and language exposure to quantify their lived diversity experience. Results suggest that exposure to linguistic and racial diversity fundamentally shapes own- and other-race face recognition from the first year of life. We discuss the potential long-term impact of early imbalances in exposure on social perception.

Session 8

Fri 29th August, 10:00 - 11:00

Decoding infants' category knowledge using advanced EEG Multivariate Pattern Analysis

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For several decades, much of developmental research exploring infants' early categorisation skills has focused on familiarising infants with novel categories in the lab. Whilst such studies have provided evidence of infants' ability to form a novel concept under lab conditions (i.e., many exemplars presented in a short space of time with little delay between exemplars), they provide little insight into infants' category knowledge formed outside the lab. Here, we capitalised on advanced Multivariate Pattern Analysis approaches on infant EEG data – a technique that has shown recent promise in disentangling infants' neural organisation of visual categories (e.g., Grootswager et al. 2025; Xie at al., 2022). However, this prior work has focused exclusively on separating activity associated with specific (often superordinate) categories (e.g., animate vs inanimate). In the current study, we extend this work by using decoding analyses to separate a higher order marker of a basic-level category's familiarity rather than decoding neural signatures associated with specific categories. Indeed, previous work has shown that there may be distinct neural representations associated with seeing an object that belongs to an existing concept compared to one that is unfamiliar (Gliga et al., 2010; Pomiechowska & Gliga, 2021). We adapted a recent EEG category change detection paradigm (Pomiechowska & Gliga, 2021) to show infants' a familiar (e.g., ball) or unfamiliar (e.g., stapler) object on a screen that was then occluded before revealing a within- or across-category object change. Across the task, infants saw objects from 6 familiar and 6 unfamiliar categories, using CDI norms to designate a category's familiarity. During initial object presentation, we trained a machine learning algorithm (Bae & Luck, 2018, Lopez-Calderon & Luck, 2014) to detect patterns of neural activity depending on an object being classified as familiar or unfamiliar to 12-month-olds. Our preliminary decoding accuracy plots suggest that neural activity associated with seeing an object that belongs to a familiar or unfamiliar category may be distinct in the first few hundred milliseconds. Examining differing scalp distributions, we will present decoding analyses from the initial object presentation, object occlusion, and the object change using ERP and time frequency data in theta, alpha, and gamma bands (previously associated with object processing). We will also present univariate analyses of infants' Negative Central ERP responses to the object change, examining whether this differs for familiar vs unfamiliar categories.

How 12-Month-Old Infants Learn Without Forgetting: Preventing Catastrophic Retroactive Interference in Sequential Object Categorization

Hiromichi Hagihara[1], Sorachi Yasuoka[1], Hanju Lee[2], Masahiro Hirai[3], and Yasuhiro Kanakogi[1]

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The rapid advancement in artificial intelligence (AI), including large language models, has significantly affected our lives. Because AI responds based on the learned data, it must continuously learn new data and update its model. However, there is a major issue in the sequential learning of AI known as “catastrophic forgetting,” in which information learned in the past is lost when learning new tasks (McCloskey & Cohen, 1989). Inspired by this intriguing phenomenon, we investigated whether a similar effect occurs in human infants’ visual object categorization, specifically, whether prior learning is disrupted by subsequent learning. Cognitive science research has often regarded infants and AI as compatible “learners,” thereby mutually importing the knowledge gained, such as using learning mechanisms in infancy to improve AI performance or using AI to make infant learning more explainable (e.g., Vong et al., 2024). This study aimed to examine whether subsequent learning interferes with prior learning in infants’ sequential object categorization (Study 1, N=34), and if so, how such forgetting can be prevented (Study 2, N=35). Twelve-month-old Japanese infants sequentially learned two types of label-guided visual object categories. Based on a previous study (Althaus & Mareschal, 2014), infants were first familiarized with a series of monster images that shared the same feature (e.g., hands are crab claws) and then tested if they formed a category using a novelty preference paradigm in which a new image from the same category, and another from a different category (e.g., hands are flower petals) were juxtaposed. Infants subsequently learned a different category (e.g., monsters’ feet are now bat wings). Soon after the formation of the second category, we examined whether participants remembered the first category. The results showed that although infants demonstrated a novelty preference in the first test (Study 1, M=.56, SD=.14, p=.016, Cohen’s d=0.44), this preference disappeared after being exposed to the subsequent to-be-learned category (M=.49, SD=.17, p=.80, d=0.04), suggesting that second-category learning interfered with their first category formation. In contrast, flashing important parts of the same category during learning successfully prevented forgetting (Study 2, M=58, SD=.17, p=.0093, d=0.47). Global post-hoc analyses exploring eye movement patterns revealed that sustained attention to key features during the first (prior) category-learning phase and comparative looking across different features during the second (subsequent) phase contributed to the prevention of forgetting. These findings bridge developmental cognitive science and AI, offering new insights into strategies for mitigating forgetting in sequential learning.

Session 9

Fri 29th August, 11:30 - 13:00

The Development of Canonical Proportion as a Function of Multilingualism, Target Language's Syllable Complexity, and Community

Kai Jia Tey[1], Sarah Walker[2], Amanda Seidl[3], Camila Scaff[1,4], Loann Peurey[1], Bridgette L. Kelleher[5], William N. Havard[6], Lisa R. Hamrick[7], Pauline Grosjean[2], Margaret Cychosz[8], Heidi Colleran[9], Marisa Casillas[10], Elika Bergelson[11], Kasia Hitczenko[12], and Alejandrina Cristia[1]

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One sign of early phonological development is the increasing prevalence of canonical syllables (consonant+vowel; Oller et al., 1998). A recently proposed metric is canonical proportion (CP): the proportion of a child's speech-like vocalisations, containing clear consonant-vowel transitions (Cychosz et al., 2021). A study of 129 children suggested that CP relates to age non-linearly, continuing to develop well beyond the appearance of children's first words; and that it varies as a function of the ambient language structure (Hitczenko et al., 2023). Here, we analyze CP development using the Speech Maturity Dataset (Hitczenko et al., under review), which includes 371 children (1-77 months: 192 boys) from diverse linguistic communities.

The dataset comprises 256,842 speech-like vocalizations, in the form of clips that are annotated through citizen science from children in Bolivia (n=44), France (10), Mexico (10), Papua New Guinea (46), Solomon Islands (198), Vanuatu (40), and the USA (California 3, Indiana 10, New York 10). We examine three factors influencing CP development: (1) monolingual vs. multilingual exposure, (2) syllable complexity of the ambient language, including simple, moderate complexity, and complex complexity (following Maddieson, 2013: monolingual data only), and (3) industrialized vs. non-industrialized community setting. We used mixed-effects logistic regression to model CP as a function of these factors.

Results show that monolingual children exhibit higher CP than multilingual peers (Estimate = -.74, SE = .17, z = -4.34, p < .001). CP is also higher in children learning languages with simple syllable complexity compared to those acquiring moderate syllable complexity (Estimate = -.70, SE = .15, z = -4.81, p < .001) and complex syllable complexity (Estimate = -.93, SE = .27, z = -3.43, p < .005). In contrast, children from industrialized and non-industrialized communities show comparable CP trajectories (Estimate = -.42, SE = .57, z = -0.74, p = .46).

These findings highlight the role of phonotactic complexity and multilingual exposure in early phonological development, suggesting that both distributed language input and phonological constraints influence early vocal patterns. The results support the view that children's early vocalizations reflect the structural properties of their ambient language. Moreover, this work provides insight into how phonological acquisition unfolds across diverse language-learning environments.

Early Language Acquisition: From Birth Order Effect to Child-to-Caregiver Ratio

Audun Rosslund, Natalia Kartushina, Nora Serres, and Julien Mayor
University of Oslo, Oslo, Norway

Previous research has demonstrated that the number of older siblings a child has is negatively associated with developmental outcomes, including language. Sibling characteristics, such as their sex and age, might modulate this effect, yet the literature is too sparse to consolidate this claim. The current preregistered study examined associations between birth order, sex and age gap of siblings, and parent-reported vocabulary size in 6,163 Norwegian children aged 8–36 months across various sibship compositions.

Our results revealed that birth order was negatively associated with vocabulary, but exhibited a U-shaped trajectory: Vocabulary sizes declined with increasing birth order but improved beyond third-born. To better understand these findings, we introduced a ‘child-to-caregiver ratio’ to capture household dynamics, where old-enough siblings would contribute positively to the language environment of their younger siblings, rather than competing for parental resources. A data-driven exploration of sibling sex-specific age thresholds showed that the best model specifications were observed when female siblings were considered caregivers 1–3 years earlier than male counterparts. The child-to-caregiver measure outperformed the traditional birth order measure in explaining variance in vocabulary and revealed that children in households with higher child-to-caregiver ratios had lower vocabulary sizes than their peers (both expressive and receptive: b = -0.09, p <.001).

Our findings suggest that sibling influence on vocabulary development extends beyond negative birth order effects and indicate that older siblings transition from competing for resources to contributing positively to the language environment of younger siblings – and female siblings earlier than males. A child-to-caregiver ratio might better capture the interplay between resources and demands within households. Researchers are advised to control for the child-to-caregiver ratio in their models (using our Shiny app; https://socialnet.uiocloud.no/socialApp/ctc-ratio/) rather than the number of siblings.

The Social and Environmental Contexts of Infants' Exposure to Abstract Words

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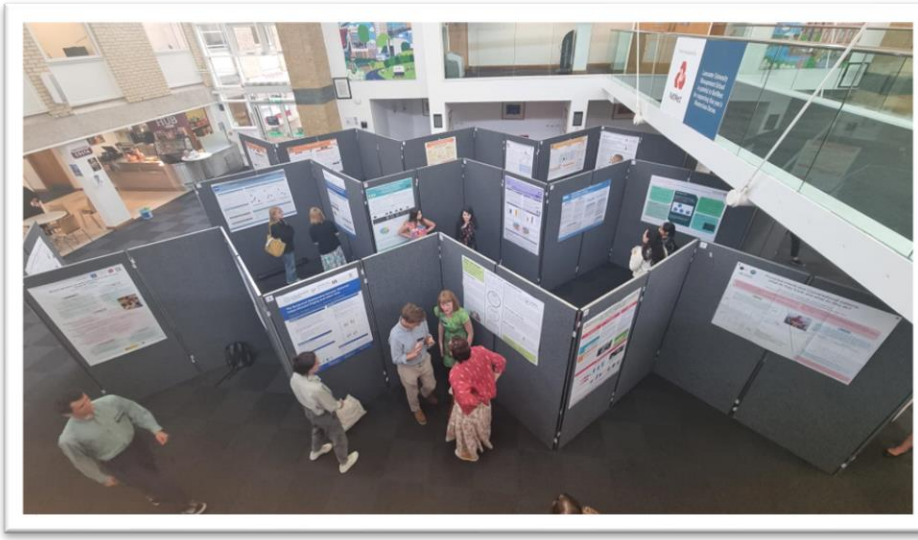
The pace and breadth of early vocabulary development is impressive to say the least: Infants grow from producing their first words around 12 months to using over 500 words by 2 ½ years. How do infants acquire so many words in a relatively short period of time? We assert that learning language is embodied and embedded: Infants actively engage with their environments in the presence of socially responsive partners who provide semantically relevant input that scaffolds word learning.

Nonetheless, the dominant focus of word-learning studies is on 'nouns'. For example, caregivers name objects in a tight time window surrounding infants' visual and manual attention to objects. Much less is known about infants' experiences around abstract words—such as words for actions number, space, and magnitudes. Such words are particularly hard to learn, because infants must extract their invariant meaning across fleeting and varying experiences. For example, 'turn' can refer to turning a knob, a steering wheel, a body in space, etc. Circle can refer to the moon, a plate, the shape of a rug. 'Big' can refer to a dog that is bigger than a cat, yet smaller than the elephant. How often do infants hear abstract words, during which activities, with which materials, and what social cues help signal the word's meaning?

We report studies from our lab on infants' exposure to abstract words. We gathered natural data on infants' everyday exposures to verbs, numbers/quantifiers, spatial terms, and magnitude by videorecording infants (12-24 months) and mothers during activities at home (1 to 2 hours per visit, Ns=30-100). We conducted experiments to test whether changing materials would elicit changes to abstract talk. We transcribed interactions, identified and annotated abstract words, and marked contexts of exposure.

Findings revealed that infants' exposure to abstract words is frequent (e.g., over 15% of speech contained a word for number, space, or magnitude). Specific abstract words were repeated across varied referents and contexts (e.g., one infant heard the spatial word up 30 times). Moreover, salient cues accompanied exposure to abstract words (e.g., spatial terms down, under, behind as infant moves through space). Notably, certain activities amplified exposure to certain types of words (e.g., mealtime for magnitudes). Finally, experimental manipulation revealed amplification of specific abstract words under certain conditions: 'Locomotor verbs' were amplified in the presence of push toys; spatial words with shape-sorters and puzzles. We discuss implications for theories of word learning and language interventions.

POSTER SESSION 1



A1 Investigating visual attention differences and relationships with accuracy during word learning in autistic and neurotypical children

Charlotte Rothwell[1,2], Gert Westermann[2] and Calum Hartley[2]
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To learn new vocabulary, children must attend to the correct visual stimuli whilst also listening to, and retaining, the corresponding auditory stimuli. Autistic children's word learning may be hindered by differences in visual attention that restrict their intake of information from the environment, potentially impacting their encoding of novel word-referent associations in memory. This study investigated how autistic children's visual attention to stimuli influences their referent selection and retention accuracy for novel words after 5 minutes and 24 hours. Autistic and neurotypical children matched on receptive vocabulary used a touch-screen computer to fast map novel words associated with animals (high-interest stimuli) and objects (neutral-interest stimuli), whilst their visual attention was recorded via multiple cameras. Analyses of in-trial visual attention revealed that neurotypical children spent longer looking at targets during referent selection than autistic children. However, autistic children looked at targets significantly more frequently than neurotypical children at all word learning stages, and more frequently at targets in the animal condition at 5-minute retention. In-trial visual attention predicted response accuracy at referent selection and both retention stages for autistic and neurotypical children. Looking at referent selection also predicted 5-minute and 24-hour retention accuracy for both groups, suggesting that visual input during initial encoding influenced children's likelihood of successfully forming long-term word-referent representations. This indicates strong relationships between attention and learning accuracy. Overall, these findings demonstrate that whilst population differences in visual attention may be present, they do not have a detrimental impact on autistic children's word learning under experimental conditions when expectations are based on receptive vocabulary.

A2 How does extraneous perceptual information influence neurotypical and autistic children's application of the shape bias?

Sophie Lund, Padraic Monaghan, and Calum Hartley
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To learn new words children must engage in referent selection (identification of meaning), retention (storage in memory for later retrieval), and generalisation (extension of labels to novel referents on the basis of shape; the shape bias). One way in which children referent select accurately is to rule out familiar objects as possible targets based on the mutual exclusivity principle. Previous research finds that when these familiar objects are of the same colour as the novel object, as opposed to different colours, neurotypical children are more accurate in their subsequent application of the shape bias. It is suggested that holding colour constant during learning supports generalisation because it encourages children to attend to shape more carefully, resulting in more robust shape-based encoding. It is unknown whether this manipulation affects autistic children, a population that often experiences difficulties in their application of the shape bias. Here, thirty-two autistic and thirty-two neurotypical children matched on receptive vocabulary used mutual exclusivity to learn new words via a touchscreen computer. Familiar and novel objects were either all the same colour or different colours. Following a 5-minute delay, children's retention and generalisation was tested. As expected, neurotypical children's generalisation was significantly more accurate when learning from same-coloured objects compared to different-coloured objects. Moreover, their generalisation was below chance accuracy in the different colours condition. Contrastingly, autistic children's generalisation was similar and above chance levels in both colour conditions. Neurotypical children's application of the shape bias may have been enhanced by learning from identically coloured referents, due to heightened attention to, and encoding of, object shape. Whereas, autistic children's attention may not be directed to shape via this manipulation, and they may instead benefit from increased opportunities to compare and contrast novel and familiar objects on multiple perceptual dimensions.

A3 A discussion of the 'set value - to - counting word' mapping problem

Claudia Uller
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A fascinating topic in developmental cognitive science is the infant capacity to represent sets and learn the count words that label the set. The question is – how do they do this? Recent work both in developmental science (Carey et al. 2017; Wang & Feigenson 2019) and cognitive science (Laurence & Margolis 2024, Samuels & Snyder 2024) has highlighted the necessity for studying further the infant numerical capacity, and the theoretical underpinnings of this knowledge, especially concerning the relationship language and number – that is, how infants come to represent the numerosity of a set and establish the mapping of the numerosity to the word/label that names that numerosity in the language that they are learning. There is still much debate about the theoretical foundations of number concepts, and psychologists, linguists and philosophers have wondered how speakers of languages that do not present in their structure words to denote specific numerosities represent number [cf., for example, communities in the Amazon such as the Tikuna, who have a 'one, two, three, many' system (Uller & Faco Soares, 2023)]. Recently, developmental science has proposed the existence of a two-system foundation to explain how children learn the mapping set value-word (Carey & Barner 2019; Carey et al. 2017). In first instance, a 'small number system' which operates based on the representations of individuals in short-term memory allows infants to learn the association between ones, twos, threes (and possibly fours) in sets and the words in their language. A second system follows, in that older children then learn via counting algorithmic rules (successor function, one-one correspondence) the larger number mappings. An alternative view suggests that (1) a single, analogue magnitude system (AMS) underlies this process, and (2) 'counting' helps infants from the outset in representing number (Wang & Feigenson 2019, 2023). In this paper, we tease apart the two proposals, and discuss the empirical evidence to date offered to support both frameworks. We also aim to provide data from two experiments to address this problem.

A4 Linguistic differences count for early number word learning

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The timely and correct learning of number words in a foundation on which children's later mathematical - and educational - attainment rests. Evidence suggests that children often first learn the count sequence before a full mapping of number word to number concept is achieved. Much research has focused on how children achieve this exact mapping of number word on to quantity, but to date much less is known about the linguistic representations of number before the fuller, adult-like representation is learned. Crucially, environmental factors, such as exposure to number words in the home, and linguistic factors, such as how numbers are spoken about and used in different languages, will all play a role in exposure to number words early in life. Research to date however has not characterised these cross-linguistic trends and differences in number word acquisition. Here we address this by examining patterns of number word learning across cultures and languages using parental report made available on the wordbank repository and collected in the lab. Our goals were to examine when children started using the number words "one," "two," and "three;" to examine whether age of acquisition varies across languages; and to examine the link between linguistic factors such as frequency of hearing number words and the learning of number words. We characterised the trajectory of number words in 16 different languages between 12 and 36 months of age. Using a generalised mixed modelling approach, we find that parents report that "one" is learned before other number words, and that "two" is learned before "three" although the slopes vary across languages. Interestingly we find that there are vast cross-linguistic differences in the learning of number words. Some of this variance can be explained by typical usage of number words across languages, seen by taking linguistic data from CHILDES. Together these findings shed light on how number words are learned across cultures and the linguistic factors that make up the partial comprehension that precede the adult-like mapping on to exact quantities.

A5 Baby vs. Machine: Do infants prefer listening to natural or synthesised infant vocalisations?

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Sensorimotor feedback plays a guiding role in learning and development. To produce speech sounds or gestures, babies must map sensory information from the environment and their own bodies onto articulatory movements. This is well-studied in babble and word-learning. But does sensorimotor feedback begin influencing vocal development before babble emerges, during pre-babble vocalisations (~4-6 months)? Early turn-taking and imitative episodes like smiling and tongue-poking suggest sensorimotor experience shapes oral motor development as early as ~3 months. By ~3 months, infants also show a preference for familiar environmental sounds, attending longer to caregivers vs. strangers, human voices vs. music, natural vs. synthesised vocalisations, and humans vs. primates (Mehler et al., 1978; Standley & Madsen, 1990; Vouloumanos et al., 2010). By ~4-5 months, infants have begun creating and becoming familiar with many of their own sounds, and by ~6 months, they prefer synthesised infant vs. adult vocalisations (Polka et al. 2022). We build on this research, asking whether infants prefer vocalisations produced by infant vocal tracts vs. acoustically equivalent synthesised sounds. We will present 4-5-month-olds with natural and synthesised infant vocalisations, matched for pitch and formant structure, in a remote listening preference paradigm, using Habit2 over Zoom. We are recruiting 30-40 infants (allowing for attrition) with no known hearing impairment or risk of developmental conditions, from monolingual homes (75% ambient English). Data collection will start in March 2025. Following previous findings, we predict infants will prefer natural infant vocalisations. If infants do not prefer natural vocalisations, previous findings may reflect simply a preference for higher-pitched sounds (rather than more familiar, infant-like sounds). Nonetheless, if infants show any discrimination across conditions, this would indicate recognition of real human vocal tract properties, controlling for all acoustic features, suggesting that infants are learning from sensorimotor feedback from their own vocal behaviour as early as ~4-5 months.

A6 Parental use of cognitive mental state terms with young children in Singapore: Insights from a wordless picture book narration activity

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Theory of mind (ToM) refers to the cognitive ability to regard the self and others in terms of mental states (e.g., purpose, knowledge, belief, thought, etc., Premack & Woodruff, 1978). While some Western studies have found positive relationships between parental use of mental state terms in child-directed speech and children's ToM, some Asian studies have not found this pattern. This study aims to broaden perspectives on mental state language used in families in Singapore, a majority English-speaking country in Asia. We used a standardised wordless picture book designed to elicit discussion of mental states ('Little Orangutan: What a Scary Storm'; Styles, 2020). In a preregistered study, we document the diversity of mental state language, when such language occurs, and whether language use differs for children of different ages or parental education levels. 146 parent-child interactions (child age: 8-40 months, median = 18.6) were recorded in a wordless picture book narration activity (Woon et al., 2021). English and English/Mandarin parent-child transcriptions were coded to identify language describing cognitive acts, states and outcomes (coded as 'simple cognition' and 'cognition clarification', adapted from Slaughter et al., 2007). At the time of abstract submission, preliminary analysis is complete for 117 parents. These parents described 1,213 cognition clauses using 62 different words (51 English, 11 Mandarin). Coding has been completed for the remaining 29 families whose narrations included Malay or Tamil. The final paper will report language-use and statistics for the whole sample. The wordless picture book narration task successfully elicited cognitive descriptions: the majority of parents used simple cognition descriptions (range: 0 to 22, median = 1) or cognition clarifications (range: 0 to 35, median = 6), indicating that the task detects a wide range of parental attention to mental states during the narration. Total number of cognition clarification clauses correlated with child age ($r = .22$, $p < 0.05$) while other comparisons were not supported. The distribution of cognitive descriptions across events in the wordless picture book is discussed, along with particular linguistic forms used. While some questions remain about the culture-specificity of ToM development, these results demonstrate that a wordless picture book can be used as a standard way of eliciting speech that naturally contains a wide distribution of cognitive language within a given sample, and that non-Western parents increase the complexity of their cognitive language when speaking with older children.

A7 Investigating the role of pointing gestures in novel word learning using eye-tracking

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Learning to communicate is an essential task for infants, with early language skills being crucial for many long-term outcomes (Bleses et al., 2016; Duff et al., 2015). However, vocabulary development is highly variable (Frank et al., 2017) and struggling with this during infancy can lead to further language difficulties (Rudolph & Leonard, 2016), making it vital that we understood the correlates of successful word learning. During word learning, infants can make use of additional cues to disambiguate referents (Samuelson, 2021), and a key one of these is gesture. Language and gesture are closely related, with gesture playing an important role in infants' language development (Iverson & Goldin-Meadow, 2005). Parental gesture use improves infants' future language outcomes (Pan et al., 2005; Rowe & Goldin-Meadow, 2009), and infants' vocabulary scores positively correlate with gestures that direct their attention (Rowe, 2000). Infants' attention towards gestures therefore appears to aid their word learning. However, much of this existing evidence is based on observational data, and as such we lack direct experimental evidence into how gesture helps with word learning. The present study investigated this using eye-tracking with 45 10-24-month-old infants. Infants took part in a word learning task, during which they were taught novel words either with or without a gesture. The learning trials consisted of four conditions, which were index finger pointing, open hand pointing, looking, and language only. During these trials, infants watched videos where a novel object was either gestured to and labelled or only labelled. Infants were then tested using preferential looking, followed by additional pupillometry test trials. Preferential looking results indicated that infants were more likely to look at the correct object, and thus learn the word, when they were indicated with a gesture than if they were only labelled. Differences in performance between the gesture and no gesture conditions were also found in the pupillometry trials. These findings suggest that the attention-directing nature of adults' gestures helps infants to form connections between labels and objects, thus helping them to learn novel words. This highlights the importance of multimodal communication with infants, as it improves their word learning. There are important implications of this finding, as results suggest interventions designed to increase parents' gesture use would improve their child's language skills, and in turn later life outcomes.

A8 Can agreement marking benefit infants?

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Many of the world languages employ agreement marking, a systematic covariance between the form of (at least) two elements (e.g., in 'she bakes' the -s agrees with the singular she). The crosslinguistic tendency to mark dependencies with agreement adds redundancy and complexity to language systems (Acuña-Fariña, 2009; Leufkens, 2020) and poses significant challenges to language learners, particularly adults (Clahsen et al., 2010; Ellis, 2022). However, recently it has been suggested that redundancy can benefit child learners (Lupyan & Dale, 2010; Tal & Arnon, 2022), despite the potential of added complexity. If so, agreement might persist in languages because it helps children to learn linguistic dependencies (Lupyan & Dale, 2010). Here, we test this hypothesis by investigating whether redundant agreement marking can also benefit learning in infants. In the current experiment, 17–19-month-old infants (English L1) are exposed to an artificial language that features two noun classes, indicated by distinct noun suffixes and distinct phonological features of the noun (e.g., tidpo, jifpo, nizpo vs. tanafei, kasafei, varafei). Crucially, infants are exposed to one of two versions of this language: one with a redundant determiner that agrees with the noun, and one without (e.g., la tidpo vs. tidpo). Following exposure, they are presented with novel nouns that are either grammatical (e.g., sigpo) or ungrammatical (e.g., rikfei). Using an infant-controlled sequential looking procedure (Cooper & Aslin, 1990), we measure infants' looking time while they listen to the novel words. If infants benefit from having redundancy in their input, those in the determiner condition should better discriminate between grammatical and ungrammatical nouns than those in the no-determiner condition. However, if the redundant determiner impedes learning due to the added linguistic material to process, we should find a learning advantage in the no-determiner condition. Data collection is currently in progress.

A9 From womb to words: Sex-specific influences of fetal sex hormones and maternal mood on infant language

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Language development is influenced by biological and environmental factors, including infant sex hormones and maternal mental health. Previous research on sex hormones' role in language development focused on estradiol and testosterone [1], with recent evidence suggesting their precursor hormone, dehydroepiandrosterone (DHEA) to also predict language outcome [2]. Concerning infants' language-relevant learning environment, maternal postpartum depression - even at subclinical levels [3] - negatively affects language development, with depressed mothers engaging less with their children and using less infant-directed speech [4]. To investigate the interplay of fetal DHEA and maternal postpartum mood as predictors of language development, fetal DHEA levels were extracted from hair samples two weeks after birth (n = 46; 23 girls). Maternal mood in the subclinical depression range was assessed eight weeks postpartum using the Edinburgh Postnatal Depression Scale [5]. At 12 months, receptive language abilities were measured using the German version of the Bayley Scales of Infant and Toddler Development [6]. Multiple linear regressions revealed a statistically significant interaction of fetal DHEA, maternal mood, and infant sex. Post-hoc analyses showed that in boys, fetal DHEA interacting with maternal mood predicted language development, with a stronger negative correlation between fetal DHEA and receptive language in boys whose mothers reported better mood. In girls, however, only maternal mood predicted language development, with lower mood associated with reduced language abilities. Thus, language development in girls appears to be more sensitive to the learning environment, whereas in boys it is also influenced by fetal sex hormones involved in brain maturation - pointing to sex-specific differences in the interplay of biological and environmental factors as developmental predictors.

A10 Can British-English learning infants segment words from Italian?

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Infants track statistical regularities such as transitional probabilities (TPs) in speech, an ability argued to support native-language segmentation. For example, after familiarization to Italian sentences containing manipulated TPs, 8-month-olds learning American English tested using the headturn preference procedure (HTPP) listened longer to high-TP (HTP) over low-TP (LTP) words (Pelucchi et al., 2009).

We sought to replicate Pelucchi (2009) with infants learning British English. We familiarized 8-month-olds (N=26) to Italian sentences containing words with HTPs and LTPs. We tested their ability to distinguish between these words using a preferential-looking paradigm with automated eye-tracking. We measured looking times to a visual stimulus paired with a target word on either side of a single screen. Like American infants, British infants looked longer to HTP (M=10.48 seconds, SE=.62) vs. LTP (M=9.80 seconds, SE=.64) words. This difference was not statistically significant (t(25)=1.206, p=.239, d=.28) compared with the Pelucchi (2009) data: HTP (M=8.75 seconds, SE=.31), LTP(M=7.71 seconds, SE=.36), t(31)=3,94, p=<.001, d=.55. As a step towards testing whether this lack of evidence for segmentation is due to differences in the methods used, we assessed the reliability of the HTPP and eye-tracking procedure using Intraclass Correlations (ICC) on looking times to HTP and LTP words for our data and the Pelucchi (2009) data. Our data exhibited higher ICC coefficients, suggesting greater measurement reliability across same-type trials than obtained using the HTPP with the same materials. Although eye-tracking may reliably measure looking time, it may be insensitive to relative preference. Eye movements require reduced motor demands relative to head turns, which may result in weaker effects than the HTPP. Thus, British infants may be able to use TPs to segment, but eye-tracking fails to fully capture this. Given our findings and suggestions that eye-tracking is less sensitive to infant preference than the HTPP (e.g., Many Babies Consortium, 2020), its use might be approached with caution until its sensitivity is better understood. Alternatively, dialectal differences between American and British English may influence how similar Italian sounds to an infants' native language, and consequently how easily it is processed. In sum, our results show the value of replicating foundational studies with other samples/methods, as we may not be able to generalise existing findings across them.

A11 Risk and Protective Factors Affecting Deaf Children's Spoken Language Development

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Deafness, the total or partial loss of hearing, affects spoken language development in early childhood by disrupting deaf children's access to speech sounds (Dobie & Van Hemel, 2004). Despite early identification and intervention, deaf children are not meeting expected outcomes. In 2024, only 55% of deaf children in the UK met expected levels of language development in the Early Years Foundation Stage (National Deaf Children's Society, 2024). To understand this gap, it is crucial to examine the factors influencing deaf children's language development. While some factors related to deafness have been identified, typical language acquisition suggests that deaf children's language development may be shaped by factors beyond those directly related to deafness and are also important to examine. This paper will present a systematic review conducted to explore which factors have been included in research and identify any gaps in the literature.Eight online databases were searched for empirical studies (published 1998 onwards) that investigate the effect of at least one factor on measurable spoken language outcomes in deaf children aged 3 to 6 years. This search identified 1,234 unique studies, which are currently undergoing manual screening against the inclusion criteria. A narrative synthesis of the results will be presented, discussing each factor individually in light of the findings of the reviewed studies. We will also present a risk of bias assessment using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). This poster will present the primary findings of this systematic review that will contribute to our understanding of the factors currently known to affect deaf children's spoken language development. Importantly, it will also identify critical gaps in current research and lay the foundations for further work seeking to provide a comprehensive evaluation of predictors of language learning in deaf children.
preregistration: https://www.crd.york.ac.uk/PROSPERO/view/CRD42025644963

A12 The language abilities of children born with neonatal encephalopathy compared to children born without complications using standardised assessments and language sample analysis

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Neonatal Encephalopathy (NE) is associated with developmental delay (de Vries et al., 2010) and research suggests NE may impact children's language abilities (Chin et al., 2019). However, the profile of language development in children born with NE remains relatively undefined. Language sample analysis (LSA) captures a nuanced range of conversational abilities in children and has been used to complement standardised assessments of language (Ebert & Scott, 2014). LSA has helped characterise the language profile of children in other clinical groups but has yet to be applied in the context of NE.The current study compared the language abilities and the quantity and quality of speech used by children born with NE (49 children; NE group) to an age matched group of children born without complications (49 typically developing children; no-NE group). The language abilities of all 98 children, with a mean age of 35.74 months (SD = 15.00), was measured using an age-appropriate standardised assessment. In addition, thirty-four of these children and their mothers (17 in the NE group and 17 in the no NE group) took part in a semi-structured parent-child interaction. Child speech was transcribed and examined for both quantity and quality using LSA. When compared to the no-NE group, children in the NE group scored significantly lower on standardised assessments of language, including the receptive and expressive language subdomains of the Bayley Scales of Infant and Toddler Development (Bayley-III) and the Verbal Comprehension Index of the Wechsler Preschool & Primary Scale of Intelligence (WPPSI-IV). There were no significant differences in the quantity of speech used by the two groups. However, children in the NE group used more nouns in their speech. Overall, children born with NE exhibited differences in their language profile compared to those born without complications. This poster will present new findings on the long-term impact of NE on children's language development.

A13 The relationship between family socioeconomic status and children's preschool language abilities: A meta-analytic review

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On average a 24-month-old speaks around 200-300 words and understands around 600-700 words. By 36-months-old they will typically speak around 900-1,000 words and understand up to 1,500 words (Dale & Fenson, 1996). Meaning children add almost 70 new word meanings to their vocabulary every month. However, significant language gaps exist, evident as early as 9-18 months old, and particularly for children from families of lower socioeconomic statuses (SES): In the UK, 5-8% of children display early language difficulties, and over 20% of these children grow up in low-income households (Law et al., 2017). For these children, they are thought to be behind their higher-SES peers in vocabulary development by up to 16 months at school entry (Washbrook & Waldfogel, 2010). Here, we meta-analysed the association between children's preschool language abilities and their families' SES (i.e., household income, parental education, and parental occupation), including studies that were well-powered, assessed children aged 18-60-months from the United Kingdom, and were published between 1995 and 2023. In data from Ntotal=130,340 individuals (kestimates=47, Nstudies=15) children's preschool language abilities were associated with their families' SES at ρ=.28 (95% CI from .23 to .32), indicative of a medium-to-large effect size. Our meta-analytic coefficient suggests that a SD increase in family SES would be associated with an estimated 30.96-point increase on the CDI expressive vocabulary scale and a 16.03-point increase on the CDI receptive vocabulary scale at 24-months. We observed substantial heterogeneity in the association between SES and children's preschool language abilities. But this heterogeneity could not be explained by the moderators: age of assessment, language domain, or SES indicator. However, a concentration of studies assessing language at the age of 36-months-old was observed, reflecting the increased feasibility in measuring language in toddlerhood over infancy. Additionally, 94% of estimates (k=44) used standardised language assessments, likely assessing closely overlapping language ability construct spaces that were similarly associated with family SES. No SES indicator emerged that had a particularly strong association with children's preschool language abilities and thus should be the target of interventions. Our findings show that there is pervasive family background inequality in children's language development, with children from higher SES backgrounds achieving on average higher scores across language ability measures. Highlighting the need for interventions aimed at remediating SES disparities.

A14 Uncovering Latent Semantic and Grammatical Development Embedded in Word Form: A Data-Driven Analysis of Early Vocabulary in English and Mandarin Chinese

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Although many languages share similar developmental patterns, language-specific differences also exist (Frank et al., 2021). For instance, English is heavily biased toward nouns for early words, whereas Mandarin Chinese exhibits a relative advantage for verbs. Cross-linguistic similarities and differences in early lexical development have largely been investigated using the MacArthur-Bates Communicative Development Inventory (CDI), a caregiver-reported checklist of children's vocabulary (Fenson et al., 1993). Over 105,000 CDI administrations are publicly available (Frank et al., 2017), offering an unprecedented resource for global-scale exploration. However, methods for summarizing and comparing this high-dimensional data remain limited. Most rely on predefined categories or naive summary measures (e.g., age of acquisition). While useful, these top-down approaches risk overlooking the nuanced landscape of early lexical development. To address this challenge, we applied a data-driven machine learning–based approach using a variational autoencoder (VAE; Hagihara et al., 2023). A VAE is an unsupervised neural network that projects high-dimensional input data onto a lower-dimensional latent space and reconstructs data resembling the original input. This generative property maintains high interpretability in the latent space while compressing complex data. We trained separate VAEs on CDI data from American English (N=9,093) and Beijing Mandarin (N=1,056). Both datasets yielded an arc-shaped structure in the 3D latent space, capturing both the overall developmental progress and diverse developmental trajectories. We also identified interpretable key features, such as a bias toward nouns or verbs, and a tendency to learn common vs. uncommon words. Notably, data-driven summaries of developmental features from our VAE model exhibited that only in the English dataset, certain early-learned nouns (e.g., shoe, cup) were classified into a verb cluster during early lexical development and later shifted to a noun cluster. This supports prior findings arguing that early nouns denote holistic events rather than mere objects (e.g., Hagihara et al., 2022; Nelson, 1986). These cross-linguistic contrasts invite a reframing of conventional views: instead of—or in addition to—viewing English as noun-biased and Mandarin as verb-biased, English may allow some fluidity between nouns and verbs in emergence, while Mandarin shows a clearer noun-verb distinction. These findings reveal that, even without predefined categories, our approach can reconstruct both broad linguistic categories (e.g., nouns and verbs) and fine-grained meaningful patterns. Furthermore, our analysis highlights the potential of utilizing checklist-based "word form" data to backtrace children's semantic and grammatical development, opening a powerful window to investigate the dynamics of universal and diverse features of language development.

A15 Tiredness diminishes attention to cues in word learning

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Tiredness is a universal experience. While adults can regulate their tiredness by drinking coffee or taking breaks, infants lack this ability. As a result, a tired infant is fussy, emotionally unstable and, most importantly, lacking in attention. This inattention ultimately impedes infant learning, highlighting the importance of capturing tiredness in the moment as infants learn. A key skill developed in infancy is word learning as it builds the foundation for future language development. Infants are constantly learning new words from their environment and a disruption (i.e., tiredness) to this learning process may hinder language acquisition. Despite the potential impact of tiredness, no research has directly examined its effects. We tested this association in 45 participants, aged 10-24 months. Parents first complete the Durham Infant Tiredness Questionnaire (DITQ), a novel questionnaire designed to measure tiredness as no measure currently exists. It has a total of 31 questions in three sections examining sleeping patterns, tiredness and crankiness behaviours. Infants then complete a novel word learning task while their looking patterns are captured by eye tracking. The task shows an adult gesturing to and labelling two different novel objects (learning phase), infants are then tested to see whether they have learnt the word (test phase) using an intermodal preferential looking design. Our questions of interest were whether tiredness affected proportion of looking to the target, and whether this interacted with the gestures used in the learning phase. Results indicate tired infants have a lower proportion of looking to the target object in the test phase. However, this relationship is affected by gesture. If a gesture is presented during the learning phase the proportion of looking in the test phase is higher even when the infant is tired. This suggests that tiredness is affecting word learning but gesture may serve as an attentional aid helping infants to overcome tiredness. This study has two crucial implications. First, it will help developmental researchers create better practices for data collection and lower attrition rates. Second, sleep problems are widely reported in individuals with neurodevelopmental disorders, making it likely they often experience tiredness, and uncovering the impact of tiredness will help develop effective interventions. Overlooking tiredness in development has restricted research from fully capturing the complexities involved in development. We are excited to present our initial findings on tiredness and language which we hope will enhance the way developmental data is collected and interpreted.

A16 The effect of maternal odor on social face processing in 4-month-old infants

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Recent studies suggest that the mother's odor facilitates face processing (Durand, 2013), identity processing (Durand, 2020), and has an impact on emotion processing (Jessen, 2020). However, it is unclear how the impact of maternal odor on these sociocognitive processes changes across the first year of life. We use both, eyetracking and EEG, to investigate the impact of maternal odor on the processing of emotional as well as identity information in infants longitudinally at 4, 7 and 11 months of age. Here, we present first EEG data from a group of 4-month-old infants (at time of submission: N=71). We employed a worn t-shirt paradigm where the infants were exposed to a t-shirt during the experiment, previously worn by either their mother or a different infant's mother. The mothers posed for pictures with either a happy or a fearful facial expression. During EEG, infants saw the pictures of their mother and a stranger. Key dependent measures for EEG are ERP amplitudes, focusing on the attention-related Nc component as well as the N290 and N400 components, related to face-processing. During eyetracking, we used the same pictures side-by-side with all possible pairs of pictures to investigate infants' looking preference. Preliminary results for EEG indicate an odor-dependent effect of identity on the Nc component with stronger amplitudes for stranger's faces compared to mother's faces in the maternal odor condition, while there is a trend towards an odor-independent effect of identity on the N290 and P400 components, with a stronger reaction towards stranger's faces. Hence, preliminary findings suggest that structural face processing (N290, P400) occurs irrespective of odor while smelling the mother leads to an increased attention allocation for unfamiliar faces.

A17 How early motor system development promotes spatial navigation: an infant MRI study

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During their first year, infants rapidly acquire motor skills—from sitting, to crawling, and eventually walking (Adolph, 2008; Adolph & Robinson, 2013). This progression has been linked to emerging cognitive abilities, particularly spatial perception. Clearfield (2004) found that infants who can walk (~12 months) performed better in spatial search tasks than crawlers. Regarding the underlying neurodevelopment, Marrus et al., (2018) showed that stronger sensorimotor connectivity correlates with the onset of walking. However, the neural basis of spatial cognition, particularly the role played by the maturation of the motor-entorhinal-hippocampal system at this developmental stage remains underexplored. Historically, developmental neuroimaging has lacked growth charts for the brain—comprehensive month-by-month references for brain maturation in infancy. While recent lifespan normative studies (Bethlehem et al., 2022) have provided valuable benchmarks for brain development, the infant years have been under sampled and higher precision of reference models are needed to map neural maturation during infancy, especially in the first 2 years of life. Without an infant-specific brain chart, brain–behavior correlations risk being anecdotal or confounded with age, limiting our understanding of neural developments associated with key motor and cognitive milestones around the first year of life. The present study investigates two aspects of early motor development. First, we analyze the developmental trajectory of the infant brain, focusing on motor cortical and medio-temporal maturation from birth to two years. Using 891 anatomical images from the Baby Connectome Project (BCP), we establish normative trajectories that serve as a reference for interpreting neural development in a smaller sample of locally collected MRI data, in critical brain regions for motor development: primary motor cortex, pre-motor area, supplementary motor area, hippocampus and entorhinal cortex, integrated into a maturity metric. Second, we examine how infants' motor abilities at 12 months (n=30) influence spatial navigation skills, and how this would be mediated by our neurodevelopmental metric of the infant motor system. Initial findings, based on region volumes, indicate that motor skills positively correlated with spatial navigation abilities ($r(46)=0.30$, $p<.05$), relative voxel size of motor regions ($r(29)=0.39$, $p<.05$) and hippocampal formation ($r(29)=0.38$, $p<.05$). Taken together, leveraging a large dataset like the BCP towards an age-adjusted neurodevelopmental metric, will provide an important step in our developing understanding of the neural underpinnings of motor and hippocampal development and their effect on spatial cognition, and how to approach brain-behavior correlations at an early developmental age more generally.

A18 Development of Object-Based Working Memory from 10 to 16 Months: A Longitudinal Study Using the "Magic Box" Manual Search Task

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Object-based working memory is a fundamental cognitive ability that allows us to encode, store representations of and use information about objects that are no longer present across short time scales. There is currently a lack of longitudinal research on how this ability develops in infancy. In the present study, we used a manual search task, the "Magic Box" task, to assess infants' ability to represent one or more hidden objects. Across several trials, between 1 and 4 objects were hidden in a box and the number of objects retrieved by infant on each trial was recorded. Furthermore, on half the trials, 1 object was surreptitiously removed to test whether infants would search longer when they expected 1 more object in the box than was actually in there. The same group of infants completed the task at 10 months (N = 141) and 16 months (N = 75). Results indicated that the capacity to represent objects in working memory increased between 10 (~1 object) and 16 months (~2 objects). Increased capacity was also demonstrated by 16-month-olds searching the box significantly longer when 1 object had been secretly removed compared to 10-month-olds, demonstrating increased representation of the 'missing' object. However, performance at 10 months was not predictive of performance at 16 months.

A19 Enhancing Cognitive Development in Young Children with Signs of Neurodevelopmental Disorders: The Role of Early Intervention in Inclusive Daycare Settings

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Currently, efforts to include young children showing signs of Neurodevelopmental Disorders (NDDs) in community-based childcare settings remain limited, both in Europe and internationally. In France, national strategies dedicated to NDDs emphasize the importance of early inclusion to optimize cognitive development and reduce the risk of cascading disabilities—particularly during the early years, when brain plasticity is at its peak. However, very few programs specifically target the inclusion of toddlers and preschoolers with signs of atypical development in mainstream daycare environments. Poulpi inclusive daycare centers represent an innovative project, offering an early intervention program called DAISEE. These early childhood units welcome 75% of children with developmental difficulties alongside a minority of neurotypical peers. Staff members are specifically trained to address the unique needs of very young children. The program promotes cognitive and social development through structured and play-based strategies, including imitation, sensory integration, and peer interactions. It targets children aged 15 months to 6 years who attend daycare full-time and emphasizes individualized goals, environmental adaptations, and close parental collaboration, all guided by a multidisciplinary team. The aim of this research is to carry out a longitudinal study of the impact of the DAISEE early intervention program implemented in the Poulpi inclusive daycare centers. A comparative longitudinal follow-up of children showing early signs of NDDs in conventional day-care centers (without the DAISEE program) is also currently underway. In addition to assessing outcomes for children with developmental vulnerabilities, the study explores how inclusive practices may benefit all children. This presentation will outline the study's core principles—launched in December 2023—and share initial findings on the developmental progress of 11 children (8 boys, 3 girls; mean age: 27 months) with early signs of NDD. We will report on their cognitive gains, as measured by the Mullen Scales of Early Learning, and their adaptive functioning, assessed using the Vineland-II Adaptive Behavior Scales, over a 12-month follow-up. The findings are expected to contribute significantly to advancing early childhood inclusive education. By fostering cognitive development, improving quality of life from an early age, and promoting equitable access to care and learning opportunities, this study supports a model of inclusive, developmentally-informed early education.

A20 Contribution of parental questions and gestures to toddlers' executive function skills in full-term and preterm groups

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Parent-child interactions provide a unique opportunity to understand the variation in early executive function (EF) skills. Parental language input is related to children's EF (Hughes & Devine, 2019). Although most studies focus on parental overall input, the effect of parental questions on children's cognitive development might be over and beyond the statements (Rowe, 2012). Parents also use various strategies while interacting with their children such as hand gestures, however, the link between parental gestures and EF is less studied. Gestures, by highlighting and conceptualizing information, can benefit children's EF skills (Gordon & Ramani, 2021). Child characteristics (i.e., neonatal status) can also influence how parents interact with their children and children's EF. This study examines the relationship between parental questions and children's EF skills based on children's neonatal status. We also investigate parental gestures while posing questions to their children. We hypothesize that questions aiming to demand an answer (i.e., WH questions) and teach children (i.e., pedagogical questions) will be related to children's EF skills. Furthermore, we expect that gestures accompanying questions create a stronger relationship between parental questions and children's EF skills. Children's neonatal status might also moderate the relationship among parental questions, gestures, and children's EF skills. Sixty-four dyads (24 preterm and 40 full-term born Turkish-learning toddlers, Mage=26.1 months, SD=1.33) were observed in a free play session. Parents' questions and gestures were coded from these sessions. We measured children's updating and cognitive flexibility skills using Hide the Pots and Categorization tasks, respectively (Bernier et al., 2010). Using hierarchical multiple regression analysis, our results showed that parental WH questions were positively related to children's cognitive flexibility skills, controlling for parental education, children's age, and neonatal status ($B = 0.05$, $SE = 0.02$, $t = 2.26$, $p = .028$). The relationship between updating skills and parental WH questions was significant only for the preterm group. For the function of questions, pedagogical questions were related to cognitive flexibility in preterm-born children ($B = 0.08$, $SE = 0.03$, $t = 2.11$, $p = .039$). More importantly, parental gestures accompanying pedagogical questions were positively related to children's updating and cognitive flexibility skills in the preterm group. Our results show that different forms and functions of parental questions and gestures might be effective in understanding the variability in children's EF skills early on. More importantly, the contribution of parental questions and gestures to children's EFs might vary based on different developmental trajectories.

A21 Cognitive Offloading Boosts Children's Tool Innovation

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Our study addresses a long-standing puzzle in developmental psychology: why are young children so poor at tool innovation? Tool innovation is a hallmark of human cognition – all societies make and use tools - yet it emerges surprisingly late in development, and decades of prior research has struggled to pinpoint why. Our study provides fresh insight into this issue by demonstrating that cognitive offloading—externalising cognitive processes onto the environment—significantly boosts children's ability to generate novel tools to solve problems. Our study presents a sample of 232 British children (aged 4–11 years) tested on the benchmark measure for tool innovation – the hook task. Failure rate is typically high in young children on this task, with previous studies finding that on average only 1 in 10 4-year-olds are successful. In contrast with previous research, we gave children the opportunity to draw a tool before trying to make it, and if that failed, draw something different and have another go. By comparing our data to existing published studies using the hook task with no offloading (N = 2800), we found that allowing children to offload significantly improved their tool innovation success rates, particularly for younger children. By their second attempt half of the 4-year-olds in the current study were retrieving the reward; equivalent to a five-year acceleration in tool innovation performance when compared to no offloading. We propose that cognitive offloading supports immature executive functions—working memory, inhibitory control, and cognitive flexibility—by helping children maintain the end goal in mind, avoid perseveration on incorrect attempts, and think flexibly about tool functions. Without offloading, tool innovation naturally emerges late in development because executive functions emerge late. We position our study within three key research areas: (a) developmental tool innovation, (b) children's cognitive offloading abilities, and (c) comparative research on human and non-human innovation. By integrating insights from these disciplines, our study offers a novel theoretical and empirical contribution to the field. Furthermore, our findings provide practical insights into how environmental scaffolds can support children's creative problem-solving. Our findings challenge existing developmental models of tool innovation and contribute to broader debates on cognitive development, problem-solving, and human uniqueness. We believe our work will be of relevance to the broad range of interests and methodologies of LCICD attendees.

A22 The Impact of Touch on Face Processing in 7-month-old Infants

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A mother picking up and cuddling her crying infant, trying to soothe them, is one of the most common scenarios in an infant's early life, where communication is limited. Touch is one of the primary senses and means through which infants learn about the environment and themselves (Narvaez et al., 2019). It implies physical proximity, providing social signals (Carozza & Leong, 2021), which is particularly relevant for infants, who are entirely dependent on cgivers and only learn to navigate their social environment. Touch is paving the way for normal neurological and socio-emotional development (Field, 2010). In adults, a special type of fibers (CT-fibers) have been implied in the processing of positive touch, especially encoding gentle, dynamic touch signals (Ackerley, 2022). The same is also true for infants, where C-tactile afferents are of special interest, as CT-targeted touch seems to be instrumental for the social well-being of individuals (Bjornsdotter et al., 2010). Hence, touch seems to be essential for early social development, yet we know little about how it affects social learning in other modalities. The present study investigates how touch influences the neural processing of happy and fearful facial expressions in 7-month-old infants, focusing on the ERP components Nc, N290, and P400 while manipulating touch type and context.
Thirty 7-month-old infants (± 2 weeks) will be tested at two independent EEG appointments within four weeks. At one appointment, infants experience their mother's touch; at the other, a female experimenter's touch (stranger's touch). Furthermore, the infants are exposed to two types of touch - CT-optimal touch (stroking-speed 3cm/s) and CT-suboptimal touch (stroking-speed 30cm/s). During both appointments, infants are presented with pictures of emotional facial expressions (happy and fearful faces) while the EEG signal and the infants' heart rate are recorded to assess neural and peripheral responses, respectively. Data collection is still in progress, but preliminary results (N = 8) suggest a heightened Nc response towards happy faces under CT-suboptimal stimulation and a reduced Nc response towards happy faces under CT-optimal stimulation. Visual inspection shows no increased neural response towards fearful faces irrespective of stimulation condition. Furthermore, a reduced Nc response towards fearful faces during the mothers' stimulation compared to the strangers' stimulation is visible. If confirmed in the full sample, this would provide evidence for a reduced threat response in the presence of (positive affective) touch and, furthermore, suggest a crossmodal influence of tactile stimulation on visual processing in infancy.

A23 What is the role of infants' attention in object learning during social interactions?

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Infants demonstrate exceptional learning abilities (Field et al., 1984), and these abilities are enhanced in social contexts. For instance, in-person interactions promote early learning more effectively than online interactions (Troseth et al., 2017). Social contingent naming where an adult labels an object that the infant is already focusing on also enhances early learning (Goupil et al., 2024; Tomassello & Farar, 1986). However, the exact role of attention while an infant is learning about a novel object category under social contingency remains underexplored. The present study offers a new perspective on this question by investigating whether heart rate variability (HRV), a physiological index of sustained attention in infancy (Richards & Casey, 1991), captures infants' attentional response to social contingent pointing and naming while infants learn about an artificial object category. To investigate this question, 12-month-old infants will first be tested using a frequency-tagging paradigm and exposed to sequences of images flickering at 6 Hz with two artificial object categories embedded at 1.2 Hz and 1.5 Hz in the sequences (pre-intervention). During an intervention phase, they will then be assigned to either an in-person or an online teaching procedure. In each case, an experimenter will teach half of the infants about object category 1 ("dax") and half of the infants about object category 2 ("riff") while the exemplars of the two categories will be presented on two separated screens, for 8 trials. Infants' first fixation will be used as an index of their spontaneous preference for one or the other object category. Then, the experimenter will respond to this fixation with either a contingent or a non-contingent pointing and naming cue (e.g., the label "dax" or "riff") depending on whether the infant looked at the category they have been assigned to, or not, and their HRV will be recorded during this period. Finally, infants' learning outcomes will be assessed at post-intervention via their exposure to the pre-intervention frequency-tagging sequences and a complementary preferential looking-while-listening task combining the items of the learned and non-learned object category. In line with Troseth et al. (2017) and Raz et al. (2020), we hypothesize that HRV will be more pronounced during an in-person than an online interaction. We also expect HRV to be increased during adults' contingent vs. non-contingent response to infants' first fixation. Overall, these results will shed light on the importance of infants' sustained attention during object learning under social contingency. Data are currently being collected.

A24 All Fun and Games: Using a Matching Task to Enhance 3-year-Olds' Performance on the DCCS Task

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Executive function (EF) ability is an incredibly important and yet often overlooked predictor of later quality of life. For instance, EF in early childhood is associated with later health, wealth, criminal offending, and socio-emotional outcomes (Richmond-Rakerd et al., 2021). Because of this, many interventions have been created to train certain aspects of executive function in attempts to enhance EF ability. Typical strategies target one aspect of EF, such as inhibition or working memory, and train this aspect through repetition. This strategy is successful in improving performance on the tasks practiced by the participants, but improvement does not generalize to other tasks (Aksayli et al., 2019). We believe that these interventions do not tend to be successful because they target EF that already exists rather than facilitating the neural structures that give rise to EF in the first place. We aim to identify neural correlates that give rise to better performance on EF tasks. We examined how children's experiences impact frontal cortex activation during the canonical Dimensional Change Card Sort (DCCS) task. The DCCS measures cognitive flexibility by having children sort cards by one feature dimension (e.g. color) and then switch to sort the same cards by another (e.g. shape). This switch to sort by a second dimension is very difficult for 3-year-olds, and most will fail to do so. Previous studies have seen improvements on the DCCS after exposure to the post-switch dimension in the form of a memory game improves 3-year-olds' performance on the post-switch dimension. We used functional near-infrared spectroscopy (fNIRS) to show that frontal cortex activation is stronger during the DCCS task for children provided this prior exposure relative to those who were not. These results illustrate how experience that influences neural structures involved in EF might help efforts to improve EF across contexts. In conclusion, EF training should focus not on the EF abilities themselves, but what ways these cognitive structures can be trained to better facilitate development of EF ability.

A25 Prenatal Vaping and Smoking: A Systematic Review and Meta-Analysis of Impacts on Offspring Self-Regulatory and Motor Development

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Combustible cigarette smoking is considered the most prominent modifiable risk factor for adverse pregnancy outcomes. Research consistently links prenatal nicotine or cannabis smoking exposure to significant neurobehavioral and motor deficits in infants and young children. With the rise in electronic cigarette (e-cigarette) use—often marketed as a safer alternative during pregnancy—understanding its long-term developmental impact is critical. However, current evidence is largely derived from preclinical animal models, leaving a significant gap in human research. This systematic review and meta-analysis examine the effects of prenatal e-cigarette exposure on self-regulation and motor development across human and animal studies while identifying commonly used assessment measures and current gaps in the research. A comprehensive search of six databases yielded 2,116 records, of which 70 studies (56 human, 14 animal) met inclusion criteria. Random-effects meta-analyses were conducted on eligible studies. Findings from emerging animal research suggest neurodevelopmental impairments following prenatal e-cigarette exposure, raising concerns about its safety and the validity of e-cigarette health claims. Meta-analysis of 42 human studies revealed significant deficits in self-regulatory and motor domains: cognitive (d = -0.35, 95% CI = [-0.44, -0.26], p < .001), emotional (d = -0.36, 95% CI = [-0.49, -0.22], p < .001), behavioural self-regulation (d = -0.49, 95% CI = [-0.62, -0.32], p < .001), and motor function (d = -0.20, 95% CI = [-0.34, -0.06], p < .001), and neuromotor development (d = -0.66, 95% CI = [-0.93, -0.39], p < .001). Despite these findings, only one human study specifically examined e-cigarette exposure, underscoring the limited research in this area. Evidence from both human and animal studies indicates that prenatal exposure to nicotine and cannabis—via combustible or electronic cigarettes—negatively impacts neurodevelopmental outcomes. However, the lack of human research on prenatal e-cigarette exposure presents a critical knowledge gap. Given the growing popularity of e-cigarettes and the potentially misleading safety claims, there is an urgent need for human studies to assess their true impact on infant development. Expanding research in this area is crucial for informing public health policies and clinical guidelines regarding e-cigarette use during pregnancy.

A26 The Interplay between Maternal Depression and ADHD Symptoms in Predicting Emotional and Attentional functioning in toddlerhood

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Maternal depressive symptoms (MDS) are highly prevalent, and linked to increased risk of emotional, behavioral, and cognitive challenges in children (e.g., Goodman et al., 2011). The integrative model for the transmission of risk to children of depressed mothers (Goodman & Gotlib, 1999) posits that the relationship between MDS and child outcomes is complex, involving various factors. One such factor is Attention-Deficit Hyperactivity Disorder (ADHD), which has been previously linked to depression (Riglin et al., 2021). Parental ADHD symptoms were associated with less positive and more harsh and lax parenting behaviors (Park et al., 2017). Despite the prevalence of this comorbidity (Choi et al., 2022), the combined effects of maternal depressive symptoms and ADHD on child development remain underexplored, particularly in early childhood, a critical period marked by heightened brain plasticity and reliance on external regulation (Kolb & Gibb, 2011; Sameroff, 2010). The study examines how maternal depression and ADHD symptoms jointly predict children's emotional and attentional development across the first two years of life using longitudinal data from 156 families. Mothers and infants were followed from pregnancy through the first two postpartum years, with data were collected at three time points: the second trimester of pregnancy (T1), three months (T2), and 24 months (T3) of infants' age (51% boys). Mothers completed questionnaires assessing self-reported depression symptoms at all time points (EPDS; Cox et al., 1987); self-reported ADHD symptoms at T1 (ASRS; Kessler et al., 2005); and toddler depressive symptoms at T3 (CBCL; Achenbach & Rescorla, 2000). A saturated path model revealed that the 2-way interaction between maternal ADHD symptoms an T1 and MDS an T2, significantly predicted toddlers' depressive symptoms and focused attention at 24 months, whereas MDS at T1 did not. Post-hoc simple slopes analysis revealed MDS were associated with greater child depressive symptoms and lower focused attention only when maternal ADHD symptoms were elevated. Findings suggest that maternal ADHD symptoms, particularly when combined with postpartum depression, may increase the risk of difficulties in toddlers' focused attention and depressive symptoms. Mothers with ADHD are more likely to engage in negative parenting behaviors, such as harsh discipline and hostility (e.g., Park et al., 2017), which, alongside MDS may contribute to toddler depressive symptoms and behaviors (Goodman & Gotlib, 1999). Additionally, these findings imply that MDS during pregnancy and postpartum are distinct and may differently impact child outcomes, warranting separate treatment approaches.

A27 Kinship and Fundamental Frequency (F0) of Singing on Premature Infants' Brain Development: A qEEG-Based Study in the Neonatal Intensive Care Unit (NICU)

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Neonatal prematurity presents significant pediatric care and developmental challenges. While neonatal advancements have improved survival, the effects of environmental sounds, and particularly music as a non-pharmacological intervention on brain development in NICUs, requires further exploration. Existing neuroimaging research is insufficient to understand the impact of live sung music's fundamental frequency (F0; a key feature of music delivery) on premature newborns' brain activity in NICU settings. This study aims to address this gap, enhancing music medicine and neurodevelopment practices in neonatal care. We hypothesizes that when premature newborns are exposed to a musical intervention provided by their mother (high F0), compared to the father (low F0) or an unrelated male/female music therapist (no kinship; high and low F0 respectively), will statistically show more visible short-term positive electrical oscillatory differentiations (i.e., based on Delta waveband quantitative analysis and profiling). This exploratory randomized control trial at a Greek hospital involves 28 infants (≤32 weeks gestation) equally divided into a musical intervention and a control group. Brain activity is measured using quantitative Electroencephalography (qEEG), enabling a comprehensive study of infants' neurophysiological responses to the different conditions (sound, music, silence) of the protocol delivered in the experimental group versus the no-contact approach of the control group (receiving standard NICU care). The statistical analysis includes Repeated Measures ANOVA for comparing brain activity across intervention days, conditions, and facilitators, as well as Time-Frequency Analysis focusing on detailed qEEG spectral power, coherence, and entropy datasets. Preliminary observations indicate brain response tendencies towards the F0 of the parents with some preference for the father's F0 in the signing condition. Continuing data collection and analysis anticipated to report more definitive insights, potentially guiding neonatal care and brain development advancements.

A28 Touchscreen technology use in infants: Parental reasoning and the role of other home learning practices

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Pediatric standards recommend extremely limited screen time before the age of 18-months-old (none or only video calls with family members), noting that limited high quality educational programming can be beneficial from 18-months-old onward as long as an adult co-uses with the infant (AAP, 2022). In particular, children under the age of three are especially susceptible to the transfer deficit which refers to difficulty learning from a screen as opposed to from a human, a deficit which occurs for both television and touchscreen devices (Moser et al., 2015). Despite these concerns, touchscreen technology use occurs in children under three (e.g., Common Sense, 2025). Understanding the reasons for touchscreen technology use in young children is important for providing appropriate recommendations and support for parents that will lead to healthy child development. The present study investigated parents' attitudes towards touchscreen technology for their infants (0-24 months), including demographics, self-reported home learning habits for math and literacy, and parental math anxiety. Recruitment is ongoing. Preliminary results (n = 43, including 42 mothers, 1 father) suggest that most infants had not used either a tablet (78.3%) or a smartphone (58.7%) before. Use of touchscreens increased significantly from 0 to 24 months, $t(39) = 3.26$, $p = .002$. Although most parents said their infant had not used a tablet or smartphone before, 56.5% indicated that their infant had watched educational clips on Youtube. Youtube watching increased with age, but not significantly, $r = .299$, $p = .068$. Parent co-use ranged from 0 to 100% of the time ($M = 79.85\%$, $SD = 34.27\%$). To date, no parent has indicated that they use touchscreens to keep their child occupied but instead list other purposes such as bonding over photographs. Open ended parental responses for reasons, concerns, and uses of touchscreen technology with their infant will be presented. Overall, this study will inform best practices on use of touchscreen technology to support children's learning for professionals working with families with young children and for researchers in the area of technology use and child development.

A29 In the Beginning: Pupil Deceleration on First Trial Predicts Habituation Speed

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Habituation procedures, and some derivatives, are used to assess various perceptual and cognitive processes in human infants. Most studies rely on visual habituation, and the duration of looking is the most common index of information processing. Typically, to assess habituation, researchers use the 3-3-50% criterion, wherein habituation requires mean looking duration on the three most recent trials to be at most 50% of the mean duration from the first three trials (Kucharský et al., 2022).
Pupil diameter has emerged as an advantageous alternative to looking duration as an index of information processing (Sirois et al., 2023), particularly because of its sensitivity to temporal dynamics unlike discrete, cumulative looking times (Jackson & Sirois, 2022). However, the relationship of pupil diameter with habituation is an open question. The rate of change in pupil diameter has been shown to index mental load in adults (Marek & Noworol, 1984), but so far has not been studied in infants. In this study, 26 infants were habituated to video sequences of a human agent interacting with a toy. Looking duration was used to assess habituation using the 3-3-50% procedure. For each infant, acceleration properties of pupil diameter in the first two trials were correlated with the number of learning trials. On the very first trial, maximal deceleration predicted the number of habituation trials ($r(24) = -0.5$, $p = .009$), but not maximal acceleration ($r(24) = 0.23$, $p = .269$), even though both derivatives of pupil diameter were highly correlated ($r(24) = -0.82$, $p = .000$). This suggests that the rate of recovery from arousal (deceleration), and not arousal itself (acceleration), is a better predictor of information processing. Neither of these predicted habituation on the second trial ($rs(24) < 0.11$, $p > .606$), although they remained highly correlated ($r(24) = -0.89$, $p = .000$). The discussion focuses on habituation assessment, as well as infant dropout rates when relying on looking time criteria. The potential predictive value of the findings for later IQ is also discussed. As part of a larger project examining the dynamic properties of the pupil, similar data from young adults and elderly participants will be presented for context.

A30 A Longitudinal Analysis of Face Saliency in Infants' Daily Visual Input

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During the first two years of life, infants obtain various types of information from faces. Newborn infants show visual preferences to face-like stimuli (Pascalis & Kelly, 2009), and their visual attention to faces increases with age (Frank et al., 2009). Among the multiple factors guiding infants' attention to faces, previous screen-based eye-tracking studies have highlighted the role of bottom-up visual saliency and its developmental changes. Reflecting the immaturity of young infants' attention control, younger infants' fixations were more driven by visual saliency, while older infants' fixations were better predicted by the location of a face (Frank et al., 2009). However, in contrast to our knowledge about how visual saliency in controlled stimuli guides infants' attention, we know little about the visual saliency of faces in infants' daily visual input. Since some visual properties of faces in infant-perspective scenes systematically change across age (Jayaraman et al., 2015), it is important to examine whether the visual saliency of faces also changes developmentally. Here, we present the first investigation of age-related changes in the visual saliency of faces in infants' everyday visual environments. We longitudinally collected infant-perspective video recordings of 2-3, 5-6, and 8-9 month-old US infants in their everyday environment using head-mounted cameras. In total, we recorded 122 hours of footage from 23 infants. We performed semi-automatic face annotations on frames sampled at 1 Hz. In 69,662 images, there were 83,352 faces located by individual bounding boxes. For each image, we calculated a saliency map based on five separate visual features and obtained the maximum saliency value within the face region as a measure of face saliency. Our results show that faces were not always the most visually prominent region in infant-perspective scenes—only 12.5 % of faces contained the most salient pixels. However, we found developmental changes in the proportion of salient faces: The proportion of salient faces was higher in younger infants than older infants. Furthermore, the time proportion of faces in view was higher for younger infants than older infants. These findings suggest that younger infants are exposed to more visually salient face instances, potentially supporting their attention to faces despite their limited attentional control. As infants progress in age, face input is less linked to saliencies and face processing may be as well (Kwon et al., 2016). The now open theoretical question is whether early saliencies help infants find the relevant features for more mature, less-salience-based face perception.

A31 The Relationship Between Self-Compassion and Teaching Efficacy in Early Childhood Education: Examining the Mediating Effects of Play Beliefs

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This study examines how early childhood teachers' self-compassion influences their play teaching efficacy and seeks to verify the mediating role of positive play beliefs in this relationship. Through this exploration, the study aims to understand how teachers' self-compassion affects their perception of positive play beliefs and to identify the pathway enhances play teaching efficacy. The subjects of this study were 208 early childhood teachers employed at childcare centers in Seoul and Gyeonggi-do. We used SPSS 23.0 for descriptive and correlation analyses and applied PROCESS macro version 3.4 to verify. First, the self-compassion of early childhood teachers positively affect their play teaching efficacy. Second, positive play beliefs mediated the relationship between self-compassion and play teaching efficacy. These results suggest that enhancing positive play beliefs and play-based teaching efficacy requires, teachers to connect with children through play, fostering their acceptance of others, beginning with self-compassion. The findings demonstrates that teachers who engage in play with children, exhibit self-acceptance and positive emotions, and hold positive beliefs about children's play, demonstrate higher play teaching efficacy. Notably, positive play beliefs mediate the relationship between self-compassion and play-based teaching efficacy. This suggests a need for continuous opportunities to develop positive play beliefs through pre-service and in-service teacher education programs. Additionally, the data indicate that teachers should not only engage in play frequently with children but also enhance interaction quality by participating actively and joyfully, positioning themselves as healthy, self-accepting play partners.

A32 Do You Feel What I Feel? A Hyperscanning EEG study of Infant-Caregiver Dyads during ostracism

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As social beings, humans need to be accepted by groups, but this fundamental need can be threatened by ostracism—rejection of individuals and groups (Williams, 2009). Ostracism is a pervasive experience, leading to neural, behavioural, and emotional responses, including increased theta power (i.e., a neural indicator of distress, and self-regulation) and negative emotional reactions (Cristofori et al., 2013). Ostracism not only affects victims but also observers. Therefore, ostracism of infants can potentially impact both infants and caregivers as their emotions may be in synchrony. To understand the neural modulation of caregivers and infants, EEG hyperscanning is used to record brain activity from both infant and caregivers simultaneously. Given that neural synchrony is influenced by states and traits that dyads bring to their interactions, it is important to assess how parental bonding affects this synchrony (Turk et al., 2022). Moreover, ostracism can be ambiguous, leading infants to show social referencing—relying on their caregivers' emotional cues to regulate their emotions (Sorce et al., 1985). Therefore, this study examines how ostracism impacts caregiver-infant neural synchrony and emotions, and how parental bonding shapes these dynamics. Thirty-four 5-to-7-month-old infants play a ball-tossing game with their caregivers in a preregistered study (https://osf.io/dzh9s). After initial inclusion, they are excluded by confederates and neural and behavioural responses are measured using EEG and a camera.Preliminary findings show age-specific theta responses to ostracism and enhanced inter-brain synchrony than in permuted condition, especially in dyads with stronger parental bonding. Behaviourally, dyads showed more negative emotions, attention, and social referencing during exclusion. This study highlights the importance of early caregiver-infant bonding in buffering the effects of social exclusion and supporting emotional and neural co-regulation.

A33 The Emotional Aspect of Lactation Consulting: Perspectives of Mothers and Lactation Consultants

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Breastfeeding plays a central role in the postpartum period and the transition to parenthood, shaping the mother-infant bond, mothers' sense of competence, and perceptions of parenthood (Hankel et al., 2019). During this period, lactation consultants (LCs) support mothers in navigating breastfeeding challenges and play a key role in determining breastfeeding success and duration (Patel & Patel, 2016). LCs are among the first and often the only healthcare professionals new mothers encounter postpartum. A handful of studies focusing on nurses and midwives suggest that lactation support improve maternal mental health. However, the extent to which emotional support falls within LCs' professional role remains unclear.
This study examined LCs' and mothers' perceptions of the emotional support provided to mothers and the mother-infant relationships during lactation consultations. It also explored whether differences in these perceptions were associated with LCs' professional qualifications and LCs' and mothers' demographics. 149 LCs (43.6% International Board-Certified Lactation Consultants [IBCLC], 29.5% Registered Nurses Lactation Consultants [RN LC], and 26.8% Lactation Educators [LE]) and 201 mothers responded to a 10-item questionnaire with parallel versions for LCs and mothers that was developed based on the "Positivity of Attitudes and Sense of Competence Questionnaire" designed for health care professionals (Zohar et al., 2021; $\alpha = .65$). This self-report assessed expectations, role perceptions, and training related to emotional support. Participants also reported their demographics. We found that LCs perceived themselves capable of addressing emotional concerns of mothers, but hesitated to discuss such topics. Mothers expected to receive emotional support from their LCs, but questioned LCs' training in this area. RN LCs expressed greater confidence in providing emotional support to mothers compared with IBCLCs and LEs. A longer lactation consultation was associated with mothers perceiving greater emotional support from LCs. These findings suggest that integrating structured emotional support training into LC curriculum is vital to enhance their confidence and competence in providing more holistic breastfeeding care during this emotionally intense period for mothers.

A34 The Effects of Parental Stress and Social Support on Infant's Socio-emotional and Language Development

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The present study investigated how parenting stress influences language and socio-emotional development and examined the moderating role of social support using data from the Baby FACES 2018 dataset (N = 2,810). Parenting stress was measured using the PSI-4-SF, social support via the HFPI Social Support sub-scale, and developmental outcomes through the MacArthur-Bates CDI and BITSEA. Our findings indicate that gender is a significant predictor, with females performing better in language skills ($\beta = 1.65$, $t(2840) = 5.76$, $p < .0001$), social competence ($\beta = -0.79$, $t(2840) = -3.47$, $p < .0001$), and problem behaviors ($\beta = .95$, $t(2840) = 8.53$, $p < .0001$). For language development, neither parental stress, race, nor social support emerged as direct predictors of language outcomes. The interaction between stress and social support was also non-significant. In contrast, parental stress was a significant predictor of problem behaviors ($\beta = .12$, $t(2840) = 5.03$, $p < .0001$). However, social support did not significantly predict problem behaviors and the interaction between parental stress and social support was non-significant. Regarding social competence, age ($\beta = .10$, $t(2840) = 18.81$, $p < .0001$) and social support ($\beta = .09$, $t(2840) = 2.30$, $p = .02$) were significant predictors, while parental stress was not. The interaction between parental stress and social support was significant ($\beta = .00$, $t(2840) = -1.98$, $p = .048$). Our findings emphasize the importance of understanding the variability and multidimensional nature of caregiving behaviors and stress, suggesting that isolating individual variables may oversimplify the complex mechanisms of early child development. Future research should explore the dynamic interplay between parental stress, social support, and child development in real-world, everyday settings.

A35 Burdened Care: Examining the Challenges Faced by Caregivers of Children with Disabilities in Ghana.

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Recent studies suggest that approximately 12.7% of children aged 0–17 years in sub-Saharan Africa have moderate-to-severe disabilities. However, limited research explores the specific challenges faced by caregivers in this region. This qualitative study explored the challenges experienced by caregivers of children with disabilities in Ghana. Participants were recruited through purposive sampling. Semi-structured in-depth interviews were conducted with 17 non-specialist healthcare workers, alongside three focus group discussions with caregivers (n=19) of children with cerebral palsy and learning disabilities. All interviews were audio-recorded, transcribed, and analyzed using thematic analysis. Caregivers reported significant barriers to accessing healthcare and education for their children. Additionally, societal stigma including negative attitudes, isolation, and discrimination intensified their emotional and psychological stress. Many caregivers experienced broken family relationships, such as partner abandonment or lack of support from extended family members. These factors collectively increased the burden of care, pushing some caregivers to extreme coping mechanisms. In severe cases, this overwhelming burden contributed to the neglect of children with disabilities and, in some instances, acts of infanticide. These findings underscore the need for caregivers to be armed with the necessary skills and access to care, and psychosocial support to promote the long-term healthy development and survival of children with disabilities.

A36 Strengthening Families and Communities: Lessons from the NSPCC Building Brains Together for Childhood Initiative

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The NSPCC's Building Brains Together for Childhood (BBTfC) initiative in Grimsby, part of the broader Together for Childhood (TfC) programme, simplifies complex infant brain science to empower parents and carers. Using relatable metaphors and evidence-based concepts, BBTfC enhances understanding of early brain development and fosters stronger parent-child connections. This locally driven programme aligns with the national 'Start for Life' goals, ensuring positive early experiences for children. This evaluation, grounded in continuous learning, utilised mixed methods - qualitative and quantitative questionnaires, interviews with 20 parents and carers, and reflective diaries from TfC practitioners. Thematic analysis revealed that BBTfC enhances parenting knowledge, resilience and access to resources, all within a trauma-sensitive environment. Crucially, BBTfC reflects the importance of placing data in context. By transforming raw data into actionable insights, the programme demonstrates how iterative evaluation can drive systemic change in the community. This developmental approach ensures the intervention adapts to local needs while sustaining progress.

A37 Parent-infant interaction within emerging neurodiversities: Neurofibromatosis 1 and elevated likelihood of ADHD

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Neurodevelopmental conditions can inadvertently affect early social development by altering parent-infant dynamics. While early parent-infant interactions (PII) in infants at elevated likelihood of autism are beginning to be explored, showing less socially engaged and communicative infants, less responsive and more directive parents, and lower mutuality, little is known about whether other infant conditions exhibit similar or distinct patterns. This study focuses on Neurofibromatosis 1 (NF1) and elevated likelihood of ADHD (EL-ADHD). Both conditions share early developmental features but also show distinct characteristics. NF1 infants often display slower motor development, whereas EL-ADHD infants are more likely to exhibit heightened activity levels and emotional reactivity. Understanding how these similarities and differences shape PII may inform a transdiagnostic approach to early social intervention. Participants included infants with NF1 (10m: n=22, 14m: n=26), EL-ADHD (10m n=19, 14m: n=20), and TD (10m: n=40, 14m: n=28), along with one of their parents. Parent-infant free play interactions were videotaped and blind rated using the Manchester Assessment of Caregiver-Infant Interaction (MACI). 37% of videos of PII were selected equally from both points and were independently coded, with excellent intraclass correlations. Longitudinal linear mixed models with maximum likelihood estimation were used to analyse each MACI scale, in addition to cross-sectional ANCOVA analyses to pinpoint group effects at each time point. Distinct patterns of PII are evident at 10 months, with lower parent sensitive responsiveness, parent nondirectiveness and dyadic mutuality in the NF1 relative to the TD groups, and livelier infants with less negative affect in the EL-ADHD group relative to both other groups. These findings are somewhat consistent with the early neurodivergent signs and behaviours observed in each respective condition in early childhood. However, the interactions of the EL-ADHD were less affected than the NF1 sample, despite both groups having evidence for early social delays or difficulties. Implications for policy, research and practice. Early PII seem to shape social development in neurodevelopmental conditions that are not primarily defined by social communication difficulties. The findings suggest that some emerging neurodivergent behaviours may disrupt social engagement more than others, and that parental perceptions and responses play a key role in shaping these interactions over time. Early parent-mediated interventions, such as sensitivity-focused parenting programs, hold promise for optimising the social environment for infants with NF1.

A38 Infants' responses to others in distress: Empathy development in the first 2 years of life

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Empathy, a vicarious socio-emotional response, is an essential component of healthy social relationships throughout life and is crucial in the individual's development of social competence (Anderson & Keltner, 2002; Decety, 2015). The past decades have seen significant advancements in the study of empathy, particularly in the first years of life. This talk will share some key recent discoveries regarding infant empathy.
In contrast to the prevailing theoretical view that true empathic response hinges on a toddler's explicit (conscious) ability to differentiate self from other (Hoffman, 2000), more recent findings suggest that early in the first year of life, infants can already exhibit clear markers of concern for other's distress (Davidov et al., 2021). This is long before infants have an explicit sense of a differentiated self, yet they can implicitly distinguish between self and other. As in older children, infants' ability to self-regulate the arousal evoked by the other's distress is crucial in determining the focus of their "feeling for" sensation, with better regulation associated with other-oriented empathy and nonadaptive regulation connected to self-distress responses (e.g., contagious crying). Research by our group and other labs shows that empathy can be reliably and validly measured during infancy and predicts subsequent relevant child outcomes. Thus, we found that individual differences in empathy by 6 months of age predict subsequent aggressive behavior in toddlerhood (Paz et al., 2020) and the risk of ASD diagnosis (Paz et al., 2024). Moreover, early empathy predicts subsequent social competence, including toddlers' pro-social behavior and young children's peer competence and emotional understanding. We will also present new findings regarding gender differences in early empathy, primarily the absence of mean-level differences as a function of both child and parent gender, as well as gender differences in patterns of correlations over time. Finally, we will discuss potential environmental influences on the development of empathy in the first two years of life, emphasizing the influence of specific parenting behaviors.

A39 Exploring the Roots of Kindness: Validating the Social-Emotional Responding Task (SERT) for Infants and Toddlers

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This study aims to shed new light on the development of kindness in the beginning of life. Kindness is a highly valued social-emotional capacity that contributes to children's well-being and positive development (Malti, 2021; Malti & Colasante, 2024; Niemiec 2013). Recent work has introduced a broader theoretical approach to kindness, encompassing empathy for both others and the self, with emotion regulation as a foundational component (Malti, 2021). However, research has primarily focused on children from toddlerhood onward, leaving the origins of kindness in earlier developmental stages overlooked (Davidov et al., 2013; 2021). To address this gap, we adapted the Social Emotional Responding Task (SERT; Malti, 2017)—originally developed for children aged 36 months and older—to assess kindness in infancy and early toddlerhood. The adapted version is an 88-item parent-report questionnaire designed for caregivers of children under three and measures three components and their building blocks: (1) empathy for others (e.g., concern for and awareness of others' distress); (2) empathy for the self (e.g., expressions of sadness over wrongdoing and early signs of self-care and compassion); and (3) emotion regulation across sadness, fear, anger, and joy. Items are rated on a 5-point scale, reflecting on typical daily parent-child interactions. Since empathy for the self has not been examined in early ages, we consider the hypotheses regarding it exploratory. Based on previous research (Malti et al., 2017; Davidov et al., 2021; Paz et al., 2022), we expected: (1) convergence within the constructs, with empathy for the self remaining exploratory; (2) individual differences in empathy for others and emotion regulation, expected to relate negatively to behavioral problems and positively to conscience development; and (3) positive links between emotion regulation and both empathy types. The association between the two empathy types is exploratory, given limited and mixed evidence in adolescents and adults (Garcia-Campayo et al., 2024). We are currently validating the SERT in a pilot sample of over 100 parents of infants and toddlers in Leipzig, Germany. Validation includes established measures of social-emotional and behavioral problems, temperament, and conscience development. Data collection will conclude by June 2025. Analyses will include confirmatory factor analyses and structural equation modeling to test construct validity and associations within and between constructs and behavioral outcomes.

This study suggests preliminary insights into the early development of kindness in infancy and early toddlerhood, with potential implications for theory, assessment, and future applications. Initial results will be presented and discussed.

A40 Listening in: Evaluating automated keyword spotting in naturalistic parent-child interactions

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Understanding the characteristics of naming events in everyday parent-child interactions is fundamental for explaining how young children develop vocabulary. However, identifying labels in naturalistic interactions (keyword spotting) is often prohibitive as manual coding of longform audio data requires substantial time, funding, effort, and expertise. Here, we focus on exploring recent advances in automated speech processing tools to assess their potential for automated keyword spotting. Validating these tools using developmental datasets is crucial since they were originally developed for other contexts and may struggle in environments with multiple overlapping speakers and background noise. We aim to explore the validity of speech recognition and wake word detection tools for keyword spotting and speaker classification in naturalistic datasets, against manual annotation. We explore two possible approaches. The first approach uses full speech-to-text transcription, while the second targets predefined words or phrases within the audio stream. We compare the outputs from these tools to manual annotations across two datasets: one from structured parent-child interactions in a laboratory setting, and another from less structured, free-flowing activities in participants' homes. By comparing performance across two datasets, each embodying common design choices for investigating parent-child interactions under varying experimental constraints, we can more precisely characterise the strengths and limitations of current speech processing methods across conditions. Through this evaluation, we aim to determine whether current tools reliably capture complex, real-world parent-child interactions. If successful, they could dramatically reduce data processing burdens, enabling scalable analysis of naturalistic audio for developmental research.

A41 Labels in Flux: Cross-Situational Word Learning of One-to-One and Two-to-One Word-Object Mappings in Monolingual Infants

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Infants face the challenge of resolving referential ambiguity when learning new words. Previous research has shown that cross-situational statistical learning (CSSL) offers one solution by allowing infants to track word-object co-occurrences over multiple learning instances, and infants also tend to adhere to mutual exclusivity (ME; i.e., each object has only one label). While previous work has consistently shown that infants can successfully learn one-to-one word-object mappings via CSSL, less is known about their ability to learn two-to-one mappings, which violates ME but is important for the learning of synonyms and, for bilinguals, learning two words, one in each of the languages they speak, for an object. Some previous work has suggested that monolingual and bilingual infants draw on the same word-learning strategies but rely on them to different extents due to their different language experiences (e.g., different statistical regularities in the input). The present study aims to investigate whether monolingual infants can relax ME when confronted with information inconsistent with ME, with both one-to-one and two-to-one word-object mappings, in a CSSL task. Infants between 12 and 22 months are shown 48 learning trials of two objects, presented with two novel words without unambiguous information on how the words map onto the objects. Across these learning trials, infants are exposed to four one-to-one (16 times each) and two two-to-one word-object mappings (8 times each). At test, two objects but only one word are presented. Time spent looking at the objects at test are recorded. Preliminary analysis on the proportion of looking time towards the target object from seven infants show that the infants did not look more at the target objects of both mapping types. The study is on-going, and we plan to include age as a variable when we have more infants to study developmental trends.

A43 Repetitive behaviours and sensory processing differences in infants with rare genetic syndromes: a planned multi-sensory integration approach.

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Research shows that individuals with rare genetic syndromes exhibit high frequencies of repetitive behaviours (Moss et al., 2009). Repetitive behaviours are often classified as “lower-order” and “higher-order”. Higher-order repetitive behaviours are cognitive and have been well investigated in individuals with rare genetic syndromes, delineating specific repetitive behaviour profiles. Questionnaire data from the Repetitive Behaviour Questionnaire (Leekam et al., 2007) revealed different syndrome groups exhibited unique profiles of repetitive behaviours, although all showed high frequencies of repetitive behaviours. Namely, the Fragile X syndrome group scored higher than at least two of the other groups on insistence on sameness, repetitive speech and compulsive behaviour subscales. The Angelman and Cri du Chat groups showed lower scores than at least two other groups on the compulsive behaviour and insistence on sameness subscales. Whilst the differences between repetitive behaviours in rare genetic syndromes has been described, potential biological reasonings behind these differences is unknown. One of the main findings in autism research behind the high levels of repetitive behaviours shown is in order to modulate their sensory environment (Nwaordu & Charlton, 2024). For instance, sensory integration therapy is often used to increase the ability to integrate and process sensations, with an aim to prevent discomfort and the manifestation of self-injurious behaviours (often described as repetitive; Schaaf & Mailloux, 2015). Therefore, this planned research will use audio and tactile devices on infants hands to investigate the differences in event-related potentials in unisensory and multisensory conditions in typically developing infants and infants with rare genetic syndromes. The frequencies of repetitive behaviours will be mapped onto sensory integration profiles and compared between both sample groups.

A44 Leveraging AI in video-based health records to assess developmental outcomes of infants with early-onset epilepsy

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Early onset epilepsy (EOE), one of the most common childhood neurological disorders, is frequently associated with impairments in social, emotional, language, motor, and cognitive development, as well as increased likelihood of neurodevelopmental conditions such as autism and intellectual disability (Hunter et al., 2020; Tye et al., 2019). (Davies, 2003; Rantanen et al., 2011; Reilly et al., 2014, 2015; Selassie et al., 2008; Williams, 2003). Recent advances in artificial intelligence (AI) have shown potential for the analysis of language and movement (Berisha & Liss, 2024; Zhang et al., 2024). These advances provide a unique opportunity to obtain quantitative metrics of children's development in domains such as motor skills, language production and social development, and could be leveraged for use in the study of early childhood development. Aims: This study aims to provide proof-of-concept for the application of machine learning (ML) to a large-scale dataset of parent-recorded smartphone videos – recorded in natural environments – to assess development and behaviour in infants and children with EOE. An advisory group of members who have lived experience (LE) of the developmental challenges associated with EOE will be recruited to provide input and guidance on aspects of the project such as ethics applications, patient and public involvement and engagement (PPIE) activities, and communication, dissemination and translation of results. To establish acceptability of and inform the research, PPIE focus groups with an emphasis on big data and AI approaches in routine healthcare will be conducted with parents/carers, children and young people, and adults with LE of developmental challenges associated with EOE. PPIE focus group findings will be analysed qualitatively and used to inform the subsequent development and validation of a training dataset of videos, in collaboration with industry partner vCreate and the lived experience advisory group. These videos will be used to test feasibility of analysing behaviour and development in parent-recorded smartphone videos by using existing ML algorithms to model the content and temporal structure of developmental domains such as motor skills, communication and social interaction. Findings from the PPIE work and feasibility study will provide guidance around application of ML algorithms to assess development in young children, and have the potential improve access to developmental assessments and to help make the monitoring of developmental changes over time more efficient and less invasive for participants.

A45 Early Locomotion, Action Verb Exposure, and Later Learning: A Cross-Cultural Perspective

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Early language learning is shaped by the dynamic interplay between infants' physical activity and the linguistic input they receive from caregivers. While prior research has extensively examined noun learning, fewer studies have investigated how action words emerge within naturalistic parent-infant interactions. Caregivers may adapt their speech to infants' locomotion status, leading to differences in action word exposure. Additionally, cross-linguistic differences in caregiver speech, such as the greater prevalence of nouns in English and verbs in Mandarin child-directed speech, may further shape action word exposure in early interactions. The present study explores how infant locomotion and caregiver speech contribute to early action word learning across cultural contexts. Specifically, we examine (1) whether the frequency of referential nouns and action words (object-action words and locomotion words) differs across infant locomotion states and cultural backgrounds, and (2) whether action verb exposure at 12 months will predict action word learning at 18 months, with locomotion and object-action verbs potentially contributing in different ways.. By analysing fine-grained co-occurrence patterns of infant movement and linguistic input, this study aims to provide novel insights into the mechanisms supporting early action word acquisition. The dataset consists of video recordings from 39 mother-child dyads (19 English-speaking and 20 Mandarin-speaking) who participated in a longitudinal study examining prelinguistic communication in three minority cultural groups in the UK. Each dyad was recorded in two 10-minute toy play sessions at 10, 11, and 12 months of age. The recordings have been fully transcribed for caregiver utterances and coded for specific infant gestures. Additionally, mothers completed adapted versions of the MacArthur Communicative Development Inventories (CDI) through face-to-face interviews when infants were 12 and 18 months old to assess their early vocabulary development. We are identifying referential nouns and action verbs in maternal utterances and coding the infant's locomotion states at the time each utterance occurs. Our aim is to complete the video coding by the end of May and begin data analysis immediately afterwards. Findings from this research will contribute to our understanding of how caregiver responsiveness to infant movement scaffolds action word learning and whether cross-cultural differences in linguistic input influence the frequency of different word types in early interactions. This work has implications for theoretical models of action word acquisition, highlighting the importance of embodied experiences and culturally structured caregiver speech in shaping infants' early lexical environments.

A46 How Predictability Shapes Infants' Information Encoding: Disentangling Sequence and Form Representation in Visual Learning

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Infants possess a remarkable capacity to monitor statistical regularities (Saffran & Kirkham, 2018; van Heugten & Shi, 2010; Rabagliati et al., 2019) and form predictions about their environment (Gerken et al., 2011, 2015; Kayhan et al., 2019; Tummeltshammer & Kirkham, 2013), guiding their attention toward information that can maximize their learning (e.g., Kidd et al., 2012; Poli et al., 2020). Substantial evidence shows that infants predict co-occurring events and modulate their engagement to stimulus sequences depending on their predictability: they disengage from sequences that are either too predictable or too unpredictable. However, little is known about how such predictability affects the depth and nature of stimulus encoding -specifically, whether infants prioritize learning about sequence structures or the detailed forms of individual stimuli, and how this trade-off is influenced by contextual predictability. This study investigates whether infants differentially encode stimuli based on the predictability of their presentation, considering both global sequence regularity and individual stimulus predictability within regular patterns (e.g., stimulus A is always followed by stimulus B). We hypothesize that when exposed to unpredictable sequences, infants will allocate their attention more broadly, thus more deeply encoding the individual form of each visual stimulus. In contrast, in predictable environments, infants may prioritize encoding sequence information, thus filtering out less relevant stimulus details (Wan & Sloutsky, 2023). Moreover, within predictable sequences composed of deterministic stimulus pairs, we examine whether the first item in the pair - the predictor, which itself is not predictable - elicits deeper encoding compared to the second, perfectly predictable item. We will present 8-10-month-olds with a series of visual stimuli arranged in semi-randomized, predictable pairs or unpredictable sequences. Following exposure, infants' encoding of stimulus form is assessed using preferential-looking tests contrasting familiar and similar, yet novel exemplars. Linear mixed-effects analyses will evaluate the effects of global sequence predictability and local stimulus type on infants' looking - a deeper encoding being associated with a stronger novelty preference. Our findings will elucidate how infants balance the demands of learning sequence structure versus encoding stimulus detail in environments of differing predictability. Results are expected to demonstrate that uncertainty promotes richer encoding of perceptual details, while predictability leads to strategic information filtering.

A47 Infants' brain responses to ostensive and referential cues in a live mother-infant interaction paradigm

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According to the Natural Pedagogy theory (Csibra & Gergely, 2009), ostensive-referential communication plays a pivotal role in infancy, as it allows the transmission of generic knowledge from adult to infant. Indeed, infants are biologically predisposed to detect ostensive cues- such as direct gaze (DG), infant directed speech (IDS), and hearing their own name - and are able to attribute communicative intent to the source of these signals. The combination of both DG and IDS has been shown to elicit stronger activations in frontal and temporal brain regions, whereas similar communicative acts directed toward another do not produce comparable neural response (Lloyd-Fox et al., 2015). Moreover, ostensive cues appear to generate referential expectations: when addressed, infants anticipate that the adult intends to indicate to them something meaningful about a referent (Csibra & Volein, 2008). If ostensive signals indeed create referential expectation, infants should process referential signals differently depending on whether they were previously addressed. To investigate this, we recorded EEG data during a live infant-mother interaction paradigm. Specifically, we aim to investigate whether the same ostensive and referential cues are processed differently depending on whether the infant is the target of the communication. We expect that frontal gamma-band activity- an index of attentional engagement (Grossmann et al., 2008) - will be modulated by communicative intent. Specifically, we predict enhanced gamma band oscillation when infants are directly addressed compared to when the same signals are directed to another person. Furthermore, if ostensive signals indeed generate referential expectations, we expect increased theta-band synchronization in frontal area - associated with the anticipation of relevant information (Begus et al., 2016), attentional orienting, and learning (Orekhova et al., 2006) - only when the infant is the addressee of the interaction. These findings will contribute to a deeper understanding of the neural mechanisms underlying social communication and early learning, highlighting how infants selectively process information based on the presence and target of ostensive-referential cues. Data collection is currently ongoing, and we will present preliminary results.

A49 Communicative Development in Early Childhood: The Role of Environmental Complexity

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Early childhood is a critical period for communicative development, during which the complexity of the environment shapes how children learn to communicate. Complex environments that involve multiple languages or dialects may foster more adaptive communication according to the COMmunicative Experience (COME) Perspective (Wermelinger et al., 2024). This longitudinal study investigates how the complexity of children's communicative environment, defined by the number of languages spoken and their linguistic distance, influences communicative development during the preschool years. We compare children with four language profiles: monolingual, bidialectal (two closely related language varieties), bilingual, and multilingual (more than two languages). We assess 320 children (~80 per group) at 2.5–3 and 4.5–5 years, two key stages when communication shifts from early integration of verbal and non-verbal cues to near-adult-like proficiency. Communication is measured using three adapted lab-based tasks. Children's likelihood of repairing misunderstandings is assessed through a cooperative activity that includes a staged communicative breakdown. The integration of nonverbal cues is examined in a task where children interpret conflicting cues such as gaze and body orientation to find a hidden object. Perspective-taking is evaluated through a task in which children must select a toy based on verbal instructions from a communication partner who cannot see all available objects, requiring them to consider the other's visual perspective. Based on the COME Perspective (Wermelinger et al., 2024), we propose that communicative differences reflect the demands of children's environments. Environments characterised by greater complexity, such as more languages or more distant languages, may prompt children to develop a broader range of communicative strategies and greater flexibility. Consequently, multilingual children may differ from their peers in these aspects. By examining how complexity shapes communication, this study deepens our understanding of early social and language development. Data collection is ongoing, we anticipate presenting data from approximately 100 children at the conference.

A50 Research Plan – Does the Conceptual Structure of Causal Events Influence Syntactic Selection in 3- to 6-Year-Old Chinese Children's Sentence Production?

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We will investigate how conceptual and syntactic structures influence syntactic selection during language development, examining 3- to 6-year-old Chinese children's sentence production. While most research conducted on adults (e.g., Hare & Goldberg, 1999) supports that conceptual information plays a role in shaping this selection, little is known about how these processes develop during language acquisition. Recent studies show that Chinese-speaking children exhibit syntactic priming by age 4 (Wang et al., 2023), and English-speaking children show conceptual priming as early as age 3 (Bunger et al., 2023). However, how syntactic and conceptual processes interact during language development remains unclear. A primed recall paradigm will be used to test this question. We will compare the sentence recall of the targets, namely resultative-free simple sentences (S+V+O) of 60 3- to 6- year-old Chinese children when they are primed with SVO sentences (S+V+O) and "bǎ(把)" sentences (S+ba+O+V) respectively, both with or without resultatives. Each condition includes 24 prime sentences. In each trial, participants will first hear the target sentence, then a prime, repeat the prime, and finally recall the target using pictures of its nouns. We will code the recalled targets and analyse the data using logistic mixed effects models. We predict that children will be more likely to recall the target sentence as "bǎ(把)" sentences after "bǎ(把)" primes, and sentences with results after resultative primes. We also expect an interaction between syntactic and conceptual primes will not be observed in 3- to 4-year-old children in their recall of target sentences as resultative-inclusive or as "bǎ(把)" sentences but will be observed in 5- to 6- year-old. The results will help us to better understand how conceptual and syntactic structures affect syntactic selection in language development.

A51 The Language of Belief in Early Childhood: Revising ToM Tasks for Cross-Linguistic Validity

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In Wellman and Liu's (2004) Theory of Mind (ToM) scale, Turkish children have consistently been found to underperform relative to their English-speaking peers on the Diverse Beliefs (DB) task (Ilgaz et al., 2022). This has raised concerns regarding the linguistic and cultural validity of the DB task for Turkish-speaking populations, as the task relies on the verb think to elicit belief attribution in the absence of evidential support. Unlike English, Turkish grammatically encodes the source of knowledge and frequently uses non-mental state expressions such as bence (in my opinion) in belief contexts (Göksel & Kerslake, 2004). To investigate this, a corpus analysis of child-directed and adult speech in both English and Turkish was conducted. The frequency of mental state verbs (think) and non-mental state belief expressions (in my opinion) was examined. It was found that think occurs frequently in English corpora, whereas its Turkish equivalent, düşünmek, appears significantly less often. In contrast, Turkish speakers more frequently use bence than English speakers. While these frequency patterns are informative, an experimental adult study was conducted to assess the extent to which bence functions pragmatically as a belief expression under specific evidential conditions. In this study, Turkish- and English-speaking adults selected among in my opinion, think, and know across three levels of evidential support: no evidence (belief formed without any observable evidence), weak evidence (belief formed based on indirect or unreliable evidence), and strong evidence (belief formed based on directly perceivable, reliable evidence). Pilot data (N = 35) revealed language-specific pragmatic patterns: English speakers preferred think in no- and weak-evidence contexts, whereas Turkish speakers selected bence in no-evidence and düşünmek in weak-evidence conditions. Full data collection is ongoing (target N = 200). Building on these findings, two child studies are planned to explore how belief expression develops across early childhood. The first will replicate the adult experimental design with Turkish-speaking children aged 3 to 5 years, aiming to investigate how children navigate expressions such as bence (in my opinion), düşünmek (think), and bilmek (know) across evidential conditions (i.e., no, weak, and strong evidence). The second will adapt the DB task by replacing düşünmek (think) with bence (in my opinion) to examine whether this pragmatic alignment improves Turkish children's DB task performance. These studies are expected to offer novel insights into how young children express beliefs and how culturally informed adaptations can enrich ToM assessments in early socio-cognitive development.

A52 Growing With Gestures: A Longitudinal Investigation of Joint Attention and Neonatal Status on Vocabulary Development

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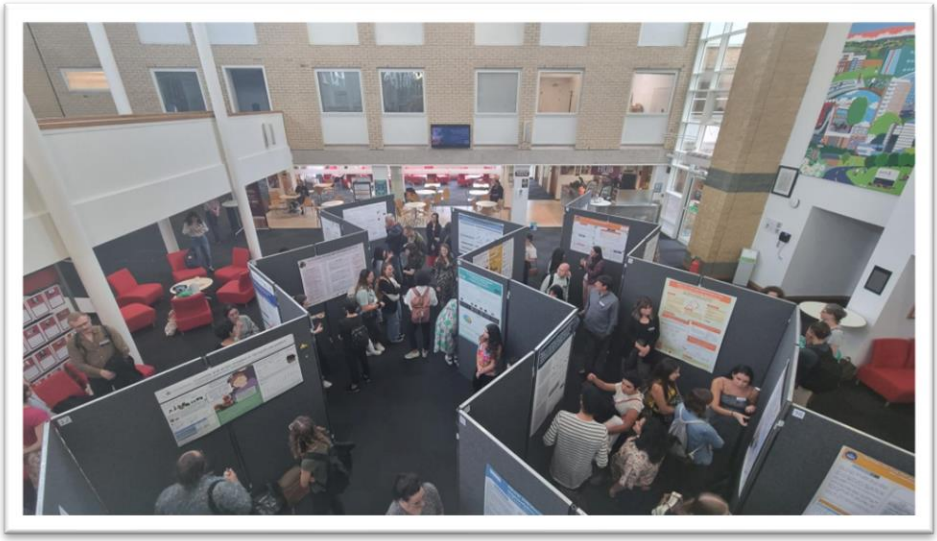
Parents' use of multimodal language benefits children's vocabulary development. The beneficial influence of parental input on language development can be differentially associated with neonatal status. Specifically, preterm children (gestational age < 37 weeks) may benefit more from parental input. Less is known about how multimodal input and other factors involved in vocabulary development, like joint attention, interactively predict preterm and full-term children's vocabulary skills. In the current study, considering the moderating effect of neonatal status, we investigated the interactive role of joint attention episodes and parental gestures longitudinally at two time points (Time-1: 12- 16 months, Time-2: 18-22 months). We video-recorded 76 Turkish-speaking parent-child dyads during free-play sessions (Npreterm= 39, Nfull-term= 37) and coded parents' gestures and the proportion of coordinated joint attention episodes (i.e., when both the infant and parent attended to objects coordinately) at both time points. Parents reported infants' early communicative behaviors using the Turkish version of the MacArthur Bates Communication Development Inventory. For Time-1, controlling for age, the results indicated that the use of representational gestures positively contributed to concurrent vocabulary scores for children who faced challenges in maintaining coordinated joint attention episodes, whereas it had detrimental effects for those with higher skill levels. However, the use of deictic gestures did not interact with joint attention. Rather, it was beneficial for vocabulary development only among preterm children. The coding for Time-2 is in progress. At Time-2, we expect joint attention episodes to mediate the relationship between parental gestures at Time-1 and expressive vocabulary scores at Time-2. Our findings indicate that the relationship between parental gesture input and vocabulary development differs among children with different developmental trajectories. We will also demonstrate whether parental gestures can enhance later vocabulary scores by helping children maintain episodes of joint attention, particularly for those who may need it.

POSTER SESSION 2



B1 Early Parenting Attitudes and Communicative Development in 12 to 18 Month Old Children: The Case of Cyprus

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This study examines the relationship between parental attitudes and early language development in children aged 12 to 18 months in Cyprus, a bilectal community where Cypriot Greek and Standard Modern Greek coexist. The research aimed to understand if and how parenting attitudes influence early communicative outcomes, including vocabulary and gestural communication. The primary research questions investigate: (1) the influence of parental attitudes on communicative development and (2) the validity of the Early Parenting Attitudes Questionnaire (EPAQ) and the MacArthur-Bates Communicative Development Inventories (CDI) in this cultural and linguistic setting. A cross-sectional approach was used, with data gathered from 20 parents of toddlers aged 12 to 18 months. Parents were administered the Early Parenting Attitudes Questionnaire (EPAQ; Hembacher & Frank, 2020) and the MacArthur-Bates Communicative Development Inventories (CDI; Fenson et al., 2007), modified for the Cypriot sociolinguistic environment. The instruments assessed parental attitudes, word understanding and gestural communication. Statistical analyses investigated correlations among parental characteristics, demographic factors and communicative skill. The study showed that parental attitudes and birth order affected early communication development in toddlers between 12 and 18 months old. A notable negative association was seen between parental emphasis on early learning and overall language understanding, indicating that excessively organized methods may impede natural language acquisition. Birth order significantly influenced outcomes, as firstborns excelled in word understanding and gestural communication compared to second-born toddlers. No significant relationships were found between love and attachment; nevertheless, attitudes prioritizing rules and respect had mixed outcomes, facilitating behavior regulation but possibly constraining exploratory, language-rich interactions. These findings highlight the necessity of promoting balanced parenting approaches that combine structured and exploratory learning environments to facilitate optimum early communication development in linguistically varied contexts such as Cyprus.

B2 How do children's scale errors relate to lexical development?: Evidence from an Eye-Tracking Study in Toddlers

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Scale errors refer to attempts to use objects that are clearly too small for the body, such as putting on miniature shoes (DeLoache et al., 2004). Their occurrence has been linked to children's vocabulary development, particularly the acquisition of verbs (Hagihara et al., 2022). Hagihara et al. also suggested that in early language development, object words (nouns) often encompass both referent objects and associated actions (e.g., "chair" implying sitting), with a gradual semantic differentiation over time. Based on these findings, it is hypothesized that during the transitional period when children begin to acquire distinct action words like "sit," the strong semantic association between objects and actions may contribute to scale errors, regardless of object size. This study examined whether children's scale errors are related to the difficulty of distinguishing objects and actions during referential selection of object words. Seventy-five children aged 15–35 months (M = 26.71 months, SD = 6.87) participated. Children first completed a scale error task, observing their behaviors toward miniature objects, followed by an eye-tracking task assessing whether they interpreted nouns as referring to objects or actions. In each eye-tracking trial, children heard prompts like "Which is the shoes?" while viewing two videos under one of four conditions: (1) Match — putting on shoes vs. rubbing a basket; (2) Mismatch — rubbing shoes vs. putting on a basket; (3) Same Object — putting on shoes vs. rubbing the shoes; and (4) Different Object — putting on a basket vs. rubbing the basket. Among the 70 children analyzed, 38 exhibited scale errors (M = 26.2 months, SD = 6.93) and 32 did not (M = 27.7 months, SD = 6.62). Children were divided into younger (<27 months) and older (≥27 months) groups based on the median age. A linear mixed model tested effects of age group, Condition, and scale error presence on looking time to the correct target. Only Condition had a significant main effect ($\chi^2(3) = 27.12$, $p < .001$), with children looking longer at the correct target in the Match condition compared to Same and Different object conditions. At the time of presentation, we will also report results from post-hoc exploratory analyses examining whether children's ability to distinguish between objects and associated actions differ depending on their scale error performance.

B3 Predicting Language Abilities in Young Children: Parental Vocabulary Knowledge and the Language Input Environment

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There are meaningful individual differences in how children learn their language (Kidd & Donnelly, 2020). One strong predictor of children's language development is parental input quality, such as vocabulary diversity (Anderson et al., 2021). Indeed, in children's first years of life, parents provide not only the main source of language input (nurture, that is, exposure to language) but also share their aptitude to learn language (nature, that is, genes). While there is a growing body of research indicating that parental effects are driving children's literacy development rather than home environments (van Bergen et al., 2017, Puglisi et al., 2017), less is known about the interplay explaining individual differences in younger children's language development. Using a SEM framework, we examined how Dutch preschooler's vocabulary and grammar skills (PRE_CELF, *N* = 333, *Mage* = 5.55 years) were explained by parental vocabulary quotients, by including parents' language knowledge and 2 indices of the home environment (reading behavior and media use). For each child, we assessed parental vocabulary knowledge using the PPVT (129 children with both biological parents, 201 children with one biological parent, 3 children without parent). In a simple model (without home environments considered), mothers' vocabulary predicted both grammar (r = .165) and vocabulary (r = .142) skills, while fathers' vocabulary predicted only grammar (r = .172) skills. However, these effects were no longer significant after adding the language input environment factors. Reading behavior had a positive effect on children's grammar (r = .208) and vocabulary (r = .167) outcomes, while media use had a negative effect (r = -.295 and r = -.194, respectively). Post-hoc analyses showed that only mothers' vocabulary knowledge was indirectly relevant to reading practices, as it was moderately related to reading behavior (r = .365). Media use was neither related to mothers' nor fathers' vocabulary use. These findings suggest that home practices, at least in early childhood, play a meaningful role in children's vocabulary and grammar skills. This is good news for parent-implemented language interventions (Roberts et al., 2019; Roberts & Kaiser, 2011).

B4 Improved outcomes for young children with delayed speech, language and communication, through early intervention: Follow my Lead.

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Better Start, Blackpool, United Kingdom

This research aims to understand if supporting parents knowledge of their child's communication style (Dempsey & Dunst, 2004) enables the voice of the child to be heard, facilitating ethical interactions and improved outcomes. This is important as Speech, Language and Communication (SLC) needs amongst children in Blackpool are higher than similar authorities (Literacy for life, 2020). The Blackpool Better Start Home Visiting Service has been developed in response to this and recognises the importance of early intervention (Heidlage et al. 2020) in minimising the impacts SLC needs have for children (Hollo et al. 2014). The intervention follows the Hanen Spark Programme, coaching parents to use communication strategies in naturalistic interactions (Wolery, 1994), with a focus on 'following the child's lead' (Weitzman 2017). During the intervention the child's voice is captured using the Lundy Model of Participation (2007) and the concept of ethical interactions during early interventions are explored. Informed consent has been gained from participants involved. All have the right to withdraw at any time. Names have been replaced with pseudonyms. Initial findings are that by following the child's lead practitioners are able to make ethical choices and decisions that prioritize the interests of children. Drawing on parent's skills leads to increased confidence and improved SLC outcomes for children.

B5 Evaluating 4.5-month-old infants' preference for self-vocalisations during vocal play

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Infants' babble production and contingent sensory experiences (i.e., sensorimotor feedback) shape their speech perception, and, potentially, first words [1, 2]. Sensorimotor mapping itself may begin during 'vocal play', around four months, when infants begin to explore and experiment with pitch, volume variation, and vowel-like sounds [3] in their vocal productions. Around this age, infants preferentially listen to infant-like over adult-like vocalisations, but also listen longer to vocalizations of other same- age infants compared to their own vocalizations [4, 5]. However, infants' preference for self- versus peer-generated vocalisations have not been explored in the context of whether the vocalisations are spontaneous and pre-linguistic in nature. The current study examines whether infants preferentially attend to vocalisations made by either themselves or same-age peers. To test whether infants learn from their own, self-initiated vocalizations, we compare their attention to voluntary vocal play stimuli versus non-voluntary coughs. Sixty 4-5.5-month-old infants (1) will complete a day-long home recording to capture voluntary vocalisations (vocal play) and involuntary non-linguistic sounds (coughs); (2) participate in an online listening preference study, measuring looking times to previously-recorded self- and peer-vocal play vocalisations and cough sounds. Data collection is ongoing; we predict that infants will (1) listen longer to vocal play vocalisations compared to coughs overall, and (2) differentially listen to peer vocalisations compared to their own. Currently, we cannot speculate on the direction of preferential attention. If infants listen longer to their own vocal play, this would indicate that they are attending to and learning from their own vocal play in early development, suggesting that sensorimotor feedback may shape learning from the very first spontaneously produced voluntary vocalizations.

B6 Babble and the Brain: Babble Becomes More Left Lateralised as Babies Gain Articulatory Experience

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How babble – babies' meaningless, adultlike consonant-vowel syllables, like [bababa] – contributes to language development is debated. Investigating which brain hemisphere drives babble – its *laterality* – offers valuable insights. Adults are left-lateralised for language and right-lateralised for emotion. One cross-sectional study found infants were left lateralised for babble and right-lateralised for smiles, interpreting this as evidence that babble is innately linguistic (Holowka & Petitto, 2002). But language is more sophisticated than babble, and infant brain activity is less localised and consistent than in adults: each region participates in many diverse behaviours, and each instance of a behaviour may involve different neuronal networks. Through accumulating perceptual and productive experience, functions are gradually recruited to the most adept networks and regions. So does babble show increasing lateralisation between its onset and when first words typically emerge? I explored this question. I analysed the laterality of babbles, smiles, and other vocalisations by measuring asymmetries in babies' lip movements, using a specially adapted method, with high ecological validity. I recorded naturalistic videos of 8 babies, twice at ~5 months, then twice per month from babble emergence (6-10 months) until 12 months, and extracted ~1500 still-frames of the face. I calculated Oral Asymmetry Indices indicating the direction and extent of asymmetry in lip openings for each. I identified the midline of the mouth using 3 facial landmarks, bisected it, and measured the area of the resulting 'hemimouths'. I used linear mixed effects models to explore effects of category (babble, smile, other vocalisation), age, and phonological milestone attainment. Babbles were right-lateralised at emergence, shifting left gradually, with distinct trajectories for mono-, bi-, and polysyllabic babbles. This left lateralisation was associated with productive experience, questioning innate/maturational theories. I propose an alternative, Emergentist conceptualisation of babble as an endogenously-emerging dynamic system, becoming relevant to language only with experience.

B7 Learning novel words in the presence of interesting distractors

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Curiosity-driven learning shapes how infants sample their environment and prioritise what to learn (Gottlieb, Oudeyer, Lopes, & Baranes, 2013; Twomey & Westermann, 2019). For example, 24-month-old children prioritise learning of words they find interesting over words that are less interesting (Ackermann, Hepach, & Mani, 2019). In the current study we investigated whether differences in (or less) interesting categories influence the learning of novel names for other, unrelated objects in the environment. Two different, conflicting hypotheses emerge: If an interesting competitor objects detract attention away from the novel object, they may impede learning of the novel name-object pairings. However, it is also possible that children's interest in the familiar categories extends towards the novel objects as well, potentially improving the learning of novel object-name pairings. In the current study, we investigate how (more or less) interesting categories impact learning of novel word-image associations in a mutual exclusivity learning task (Halberda, 2003). Infants (Age: 22-26 months, N=11, target N = 48) were presented with pairs of images consisting of a novel image and a typically known familiar competitor object. The competitor object was part of one of four different overarching categories (Animals, vehicles, clothes, kitchenware) that are known to elicit different responses in children's curiosity (Madhavan, Malem, Ackermann, Mundry, & Mani, 2024; Mani & Ackermann, 2018). Each child's individual curiosity towards exemplars of these individual and overarching categories was recorded through parental report, a preferential looking task, and children's pupillary response to exemplars of familiar categories (Madhavan et al., 2024; Mani & Ackermann, 2018). Data collection is currently ongoing and is likely completed by the start of the conference. We will analyse correlations between different (1) measures of curiosity (preferential looking, pupil dilation, parental report) (2) children's allocation of attention during the naming of the familiar object, as predicted by their curiosity measures (3) children's allocation of attention during the naming of the novel object, as predicted by their curiosity measures (4) children's identification of novel object-word combination as predicted by their attention allocation during the learning phase and their curiosity towards the competing object. Analyses will are based on mixed effects models, and models will be selected based on the AIC. Depending on the outcome of the current study, future research may investigate whether binding or separating the novel and competitor objects can change this contribution of interesting competitors on novel word-referent associations.

B8 Electrophysiological evidence of verb comprehension during infancy

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Children's spoken and receptive vocabularies feature nouns heavily during early development despite linguistic input from caregivers frequently incorporating other word types such as verbs (Au et al., 1994; Goldfield, 2000; Sandhofer et al., 2000; West et al., 2022). The prevalence of nouns in early vocabulary likely explains why experimental research has often focused on when and how infants begin mapping objects to nouns – with studies showing that infants understand several nouns by 9 months (Bergelson & Aslin, 2017; Bergelson & Swingley, 2012, 2015; Parise & Csibra, 2012; Tincoff & Jusczyk, 1999, 2012). But when do infants first begin grasping the meaning of verbs? To learn verbs – words that describe actions, events, and processes – theorists suggest that infants must employ sophisticated word and action segmentation, event processing, and verb-to-action mapping skills (Gentner, 1982; Golinkoff et al., 2002). Prior research suggests these skills are available to infants within the first year of life, by at least 10 months. In the current study, we examined whether 10-month-old infants understand verbs by measuring the N400 ERP component, a marker of lexical-semantic violation. Using a novel action-verb semantic priming paradigm, infants saw videos of everyday actions while hearing verbs that matched or mismatched the action. We also tested adults on the same paradigm to confirm that action-verb pairs reliably evoke an N400 effect comparable to previous adult studies. This further enabled us to document how the topography and time course of N400 to actions and verbs may differ across different stages of development. Both infants and adults elicited a stronger N400 response to mislabelled vs correctly labelled actions, with differing latencies and scalp distributions. The size of infants' N400 response was not related to their parent-reported vocabulary size. These results expand our current understanding of infant language acquisition by showing that by 10 months, infants understand the meaning of several early verbs.

B9 Variability constrains word learning and generalization: a neurocomputational account

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Variability is a fundamental feature of the world, requiring learners to generalise from past experiences to new contexts. As such, it is crucial to study how variability affects both learning and generalisation. In language learning, variability from multi-accent environments can either hinder or enhance word learning. To explain these findings, we used a biologically-inspired neural network, a self-organising map (SOM), to model the effects of variability in a child's learning environment. We simulated two real-world conditions: a single-dialect household and a dual-dialect household, evaluating the learning cost of increased variability and its impact on generalisation to a novel dialect. Our simulations revealed that the dual-dialect SOM learned more slowly, reflected by higher quantization errors, but exhibited superior generalization to a novel dialect. Analysis of the SOM's internal structure further support these findings. In the single-dialect condition, categorization ratings asymptote to zero, suggesting that all exemplars within a category were processed by the same neuron. In contrast, in the dual-dialect condition, categorization ratings stabilised at ~2, indicating that most categories engaged multiple neurons, with exemplars processed by nearby neurons. This broader category field, though less compact, enabled the SOM to better accommodate novel dialect exemplars, enhancing generalisation. Moreover, we found that larger neuronal regions in the dual-dialect SOM were continuously updated by the more variable input, causing neurons to tune to a wider range of stimuli across the map. While this increased variability slowed initial learning, it ultimately improved generalization, as novel instances were more likely to fall within an expanded representational space. Overall, our study demonstrates that variability in linguistic input enhances generalisation by promoting broader category representations. The self-organising process in the neural network provides a biologically-plausible explanation for how variability influences both learning and generalisation, contributing to our understanding of language acquisition.

B10 From Expecting to Expressing: The Effects of a Prenatal Parental Intervention on Bilingual Language Outcomes at 18 Months

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Rich and diverse input is crucial for children's language development. Parent-directed interventions can improve input quantity and quality, enhancing children's later language skills (Reese et al., 2010). Multilingual children are particularly vulnerable to limited input in one or both of their languages, making bilingual families an important target for early interventions (Luk & Bialystok, 2013). To explore whether it is possible to enhance parents' knowledge about bilingual development—and ultimately support children's language—we designed a research-based intervention: an online workshop on how to support early language development for expectant Polish-speaking parents living in Norway. Participants were randomly assigned to the intervention (n = 40) or control (n = 34) group. The control group participated in a parallel workshop on sleep. In both groups, we measured how parental beliefs about language development were aligned with research-based knowledge before and after the workshops. A mixed-design ANOVA revealed a significant effect of time ($F(1,74) = 31.79$, $p < .001$, $\eta^2G = .079$), and a significant time × group interaction ($F(1,74) = 11.77$, $p = .001$, , $\eta^2G = .031$), indicating that the observed increase in beliefs' alignment with knowledge was specific to the intervention group. All parents reported that by 12 months of age, their children understood some words in at least one language, and 67% reported that their children had started speaking. We tested whether children whose parents participated in the intervention were more likely to have started speaking by that age. A chi-square test showed no such difference between groups (χ^2 (1, N = 64) = 0.20). However, this measure may not be sensitive enough to show the effect of the intervention. To assess language outcomes more robustly, we are currently analyzing expressive vocabulary at 18 months in both Polish and Norwegian using the MacArthur-Bates Communicative Development Inventories (Fenson et al., 2007). This analysis was preregistered on OSF (https://osf.io/965jd) and will provide further insights into whether prenatal support for bilingual families can lead to measurable effects on children's early language trajectories.

B11 The Impact of Dialectal Variability on Word Segmentation in Infancy: Insights from Norway

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One of the earliest challenges infants face in learning language is segmenting words from continuous speech. Research shows that statistical learning—the ability to track patterns in input—plays a central role in this process, enabling infants to detect word boundaries based on the likelihood of syllable co-occurrence (Saffran et al., 1996). While statistical learning has been widely studied in monolingual infants, little is known about how it operates under linguistic variability within a language, such as exposure to two dialects. Unlike many other languages, Norwegian lacks a standardized spoken form and is instead characterized by a continuum of regional dialects used in daily life (Nesse, 2023). Bidialectal speakers thus encounter variation in phonology, prosody, and grammar, yet it remains unclear whether such exposure influences early word segmentation. To address this gap, the present study examined whether 9-month-old Norwegian infants can segment words from speech based on statistical cues, and whether exposure to two dialects affects segmentation compared to exposure to one. Using a conceptual replication of the artificial language paradigm by Saffran et al. (1996), 79 infants (43 monodialectal, 36 bidialectal) were familiarized with a continuous speech stream containing four trisyllabic “words” defined by transitional probabilities. Differences in looking times (measured via automatic eye-tracking) between familiar and novel test items were used as an index of segmentation. Bayesian one-sample t-tests indicated anecdotal evidence in favor of no novelty preference in monodialectal infants (BF_{10} = 0.41) and moderate evidence in favor of no preference in bidialectal infants (BF_{10} = 0.18). Additionally, a Bayesian independent-samples t-test indicated anecdotal evidence for no group difference (BF_{10} = 0.37). Exploratory analyses by individual test blocks and first-exposure trials yielded similar results, with Bayes Factors consistently favoring the null. These preliminary findings suggest that, at 9 months, Norwegian-learning infants—whether monodialectal or bidialectal—show no clear evidence of statistical learning for word segmentation, nor any differences between the groups. This pattern may reflect developmental constraints at this age or properties of the Norwegian linguistic environment. Future data collection aims to increase power for the monodialectal group. This study provides novel insights into early language processing in a dialect-rich context.

B12 Cortical Tracking in Newborns: Insights from adult-directed and infant-directed Conditions

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Infants must form linguistic representations in a changing acoustic environment in order to learn a spoken language. Abstract phonological representation, recently found robust at 3-5 months (Atuntas et al., 2025), has been shown as a building block for later language learning (Choi, Broersma et al., 2017; Choi, Cutler et al., 2017). This remarkable ability is convergent with evidence showing that infants at this age can robustly track spectral information in naturalistic nursery rhymes (Di Liberto et al., 2023). Open questions remain as to how much speech feature encoding is available at birth and whether abstract phonological representation is readily online then, in the context of running speech. This study recorded EEG from sleeping newborns (N = 30) while they were exposed to running speech in adult-directed and infant-directed speech (ADS and IDS), for a total of 40 mins. Temporal response functions (TRFs) capturing the temporal dynamics of feature encoding was calculated and model performance was assessed using the prediction correlation via leave-one-out cross validation. Results demonstrate that newborns have above-chance cortical tracking of amplitude envelope and some abstract phonological features such as vowel height and place of articulation in ADS but not IDS. Based on previous work (e.g., Burnham, et al., 2002) and the acoustic properties of our stimuli that IDS was more acoustically varied relative to ADS, this suggests that newborns were better at tracking acoustic information and abstract phonological features in a register with less acoustic variability. These findings contributed our understanding of newborns' speech tracking abilities, which informs theory building, as well as the model construction for infant speech processing.

B13 Unpacking learner-level and item-level variability in infant word learning

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Infants are now known to have an active role in their vocabulary development rather than just being passively exposed to new words, and the role that they play in shaping their environment has been examined in detail. One factor involves learner-level variability. Research on temperament has shown that less shy infants are more likely to explore the environment, and these differences in temperament can help shape word learning. Likewise curiosity has been a focus of much recent research, with more curious infants also found to have more successful word learning. The other factor that can help shape word learning involves the relationship between the learner and the object being learned. Familiarity with the object and cross-situational statistics are found to aid word learning, and in the same vein past research found that word learning for categories and novel objects was quicker when a child had a greater interest for both the category as a whole and specific objects independently. Therefore, in our research we investigated the role of individual temperament in word learning, examining the dynamic interplay between category and item interest, general curiosity, willingness to engage, and motivated word learning using a novel word learning task and employing pupillometry. Around 40 2-4 year olds participated in our novel word learning task where they were exposed three different blocks of trials. The first block measured their interest in different categories by exposing them to scrambled images which resolve to either blurred or clear images. The second block then teaches them the names of novel objects using congruent verbal labels. Finally, in a test phase, object images were shown alongside congruent and incongruent labels. We hypothesised that if the participant had correctly learnt the objects they should look longer and have a larger pupil size when the object is paired with an incongruent label due to a novelty preference. Caregivers also filled in questionnaires about their child's category/object interest as well as their temperament. Initial data suggests category interest to be a key factor in early word learning, supporting previous findings on category interest. Likewise we find a role for learner-level variability, with differences in temperament shaping word learning.

B14 Investigating the Early Emergence of Imagination in Infancy and Early Childhood Using a Mime-Based Methodology

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Imagination plays a foundational role in cognitive and social development, underpinning abilities such as pretend play, storytelling, and Theory of Mind (Lillard, 1993). While imaginative behaviours are well documented in children aged 3 and up (Russ, 2020; Taylor & Carlson, 1997) their earlier emergence in preverbal and early verbal children remains underexplored. This study examined how imagination develops between 14–42 months, and whether mime-based tasks can serve as valid tools for measuring early representational thinking before the onset of fluent language. Using a novel three-step experimental task, children (N = 122) completed increasingly abstract matching challenges: visual shape (Step 1), hand gesture (Step 2), and mimed action referring to absent objects (Step 3) in either a live action (N = 57) or touchscreen (N = 65) condition. These steps were designed to progressively engage imaginative capacity by requiring children to interpret and produce actions increasingly removed from immediate perceptual cues, culminating in a pure representational task—miming—that relies entirely on abstract, symbolic thought. Language ability was measured using the Oxford Communicative Development Inventory (Hamilton et al., 2000), and parents completed a bespoke questionnaire assessing everyday imaginative behaviours e.g., references to absent objects and spontaneous miming. Age predicted performance on Step 1, with higher success in the live action condition. However, neither age nor language ability predicted success in the more abstract steps. Only a small number of older children passed the most abstract, Step 3. In contrast, 90% of parents reported that their children were already referencing absent objects and miming at home, often before 18 months. With respect to engagement across conditions, no differences were found in completion rates as a function of platform, though performance patterns suggest live action may better support symbolic interpretation. These findings highlight a disconnect between structured task performance and naturalistic reports of imagination, suggesting that traditional experimental designs may underestimate early imaginative ability. Mime-based approaches show promise but must account for the contextual and social nature of early symbolic thought

B15 A systematic review and meta-analysis examining the influence of prenatal stress on child cognitive and educational outcomes

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Increasing evidence suggests that maternal stress during pregnancy may influence child development, yet the extent of the impact of prenatal stress on various psychological domains remains unclear. This systematic review and meta-analysis investigates the extent to which manifestations of maternal stress during pregnancy affect children's cognitive development and educational attainment. Following a pre-registered protocol (PROSPERO: CRD42024596588), five electronic databases were searched for relevant literature (Scopus, MEDLINE, PsycINFO, ERIC, and Embase) up to February 2024. Inclusion criteria required studies to assess maternal stress during pregnancy, through either physiological means such as measures of cortisol, or via self-report methods such as the perceived stress scale (Cohen et al., 1983). For inclusion, studies were also required to measure child development outcomes including attention, intelligence, cognitive development, or educational attainment. Studies involving postnatal stress assessments, non-behavioural measures (e.g., neuroimaging), or children with neurodevelopmental diagnoses were excluded. Study screening, data extraction, and quality assessment were undertaken independently and in duplicate, with inter-rater reliability for all stages calculated as above 90%. The quality assessment classified all 60 included studies as fair to good. The findings demonstrated that whilst utilising physiological measures of stress, variable relationships with child outcomes were demonstrated. However, when self-report measures of stress were employed, more consistent negative relationships with child outcomes were determined. There was also a larger negative effect of prenatal stress on outcomes assessed earlier in childhood compared to outcomes examined in later childhood. Moreover, greater negative effects of prenatal stress on child outcomes were observed when exposure to stress occurred closer to term. However, caution must be taken when interpreting this result, due to few studies reporting the timing of prenatal stress exposure. Overall, the findings support a meaningful association between increased prenatal stress and negative consequences for children's cognitive and educational outcomes. However, the results suggest that prenatal maternal stress does not categorically have a negative effect on child development. Rather, it is the kind of stress that the mother-to-be perceives as negative that influences children's cognitive and educational development. The results also highlight that self-report measures of maternal stress, rather than physiological measures, may be more beneficial. Taken together, these findings emphasise the importance of stress-reduction interventions during pregnancy to support long-term developmental outcomes in children.

B16 Four-month-olds anticipate the visual features of a non-human communicative agent

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Infants show an early sensitivity to contingently exchanged signals. It was found that variability in the exchanged signal sequences in a turn-taking interaction indicates information transfer as opposed to the exchange of identical signals, and induces preverbal infants to attribute communicative agency to the interacting entities. Previous work demonstrated that faces preceded by infant-directed speech elicit a stronger face-specific N290m ERP response in 4-month-olds, suggesting that communicative signals generate the expectation of a communicative partner and facilitate the processing of its distinctive features. We argue that this effect might not be restricted to human faces, and can be elicited by unfamiliar entities that have been deemed communicative. In the present study we are investigating whether 4-month-old infants can attribute communicative agency to novel, unfamiliar agents and whether such attribution facilitates the anticipation and the processing of the agent's physical appearance. In the warm-up phase, we familiarise infants with two visually distinguishable dyads of unfamiliar entities, one dyad that engages in a turn-taking exchange of variable signals (communicative condition), and one that exchanges identical signals (non-communicative condition). In the test phase, we measure the ERPs in response to pictures of either the communicative or the non-communicative entities, preceded by the congruent sound signals. We tested 7 participants (mean age = 143 days, 6F), 4 of which were included in the preliminary analysis. We observed an enhanced N290 effect in response to the presentation of the entity belonging to the communicative dyad compared to that in response to the non-communicative entity, in the right parieto-occipital region. We expect that this effect will be consolidated with additional participants, demonstrating that 4-month-old infants anticipate the visual features of non-human communicative agents.

B17 From glance to goal: Infant visual working memory as a predictor of executive function from preschool onwards.

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Visual working memory (VWM) is particularly important for verbal and written communication (Daneman & Merikle, 1996). This VWM system is implicated in executive function (EF), with representations of objects within the working memory system being important for EF skills (Buss & Spencer, 2014). These EF skills are consistently linked to academic achievement (McClelland et al., 2014). Recent research has suggested that to increase our understanding of EF, we must understand the development of EF early, when the components of EF are also developing (Spencer et al., 2025), and this includes examining VWM. Children were assessed at 6-, 18- and 30-months on a VWM eye-tracking task. Here, children visually explored a display with colourful squares blinking on the left and right of the screen. On one side, squares changed colour after each 'blink'; on the other, the colours remained the same. The Minnesota Executive Function Scale (MEFS; Carlson & Zelazo, 2014) was used as the index of EF, measured at 30- and 78-months. Results showed at both 6- and 18-months, a measure of visual exploration on the VWM task consistently predicted performance on MEFS at 30-months. This measure of visual exploration demonstrates children's ability to sustain attention to the task. Results generally showed that better sustained attention at 6-months predicted higher EF at 30-months. At 18-months, this measure also predicted higher MEFS scores at 30-months for all children with a less educated mother, although children with a less educated mother had lower MEFS scores overall. Here, we may be seeing a higher maternal education level acting as a protective factor to enable good EF despite poorer VWM. At 18-months, a new proportion looking to the change side measure on the VWM task also predicted higher EF at 30-months, particularly for children with a less educated mother. This measure indicates the ability to detect and sustain attention to novelty. It may be that directing attention to novelty early on facilitates the EF skill of flexible allocation of attention later. Looking to toddlerhood, results show the same relationships from 30-months. The measure of visual exploration once again predicted a higher EF, now at 78-months. A higher mean proportion of looking on the VWM task at 30-months was also important for EF at 78-months. In conclusion, the development of VWM and EF are related across multiple ages in early childhood.

B18 Brain Complexity and Exogenous Stimulation Enhance Cerebral Age Prediction in Premature Newborns

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Electroencephalography (EEG) provides a reliable tool for assessing cerebral maturation in premature newborns, with critical implications for identifying at-risk infants. In this study, we developed and validated a predictive model of cerebral age that integrates two complementary dimensions: (i) brain's processing of exogenous stimulation and (ii) endogenous spontaneous neural activity. We included high-density EEG from 74 premature neonates, born between 27 and 35 weeks of gestational age (wGA) and tested within their first week of life during rest and auditory stimulation. We demonstrate that the spatiotemporal complexity of neural responses to auditory stimulation increases with increasing gestational age at birth. While models based on spontaneous neural activity yield acceptable estimates of cerebral age, incorporating measures of neural complexity in response to exogenous stimuli significantly enhances predictive accuracy. These findings establish response complexity to auditory stimulation as a robust and automated biomarker of cerebral maturation. This integrated endogenous-exogenous framework enhances maturation prediction and can serve to detect deviations for recognizing at-risk premature newborns, paving the way for improved neurodevelopmental assessment.

B19 Capturing naturalistic learning in infancy: The role of labels in real-life category formation

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Categorisation is a fundamental aspect of cognition and involves grouping similar objects into "kinds" (Mareschal & Quinn, 2001). Yet, most research on infant categorisation relies on rigid familiarisation paradigms (Eimas & Quinn, 1994) that fail to capture the richness and variability of real-world learning. While verbal labelling of category exemplars facilitates categorisation in familiarisation paradigms (Waxman & Markow, 1995), this has yet to be investigated in naturalistic conditions. Here, labels may be essential to linking experiences separated in space and time. Head-mounted eye-tracking technology enables capturing infants' first-person experience of real-world learning (Franchak & Yu, 2022). Using this technology, we examine infants' categorisation during exploration of a naturalistic environment, specifically investigating the role of labelling in this process. In our study, caregivers and infants (aged 12-14 months), held in a carrier, first explored four semi-naturalistic areas (2.5 min each) in which they encountered eight different animal toys from a novel target category (2 exemplars per area, plus 2 out-of-category distracters). Half the dyads (aim N=40) were provided with a novel label for the target category ("geepee"), while others (aim N=40) were instructed not to use any animal names. A head-mounted eye-tracker (Pupil Labs Neon) captured infant's moment-to-moment gaze. Categorisation success was subsequently assessed in a preferential looking task with real objects on a stage with an occluder. A previously unseen member of the target category was presented side-by-side with an out-of-category object either similar (trials 1-2) or dissimilar (trials 3-4) to the target category in material and shape. We hypothesised that infants would demonstrate successful learning of the category only in the label condition, indicating that labels facilitate real-life categorisation in infancy. Preliminary analysis (N=16, data collection ongoing) using 2(label vs. no-label condition)×2(similar vs. dissimilar trials) ANOVA revealed a significant main effect of trial similarity, with proportion of looking to out-of-category object greater for dissimilar (M=0.69, SD=0.32) than similar (M=0.45, SD=0.38) trials, $F(13)=5.49$, $p=.036$, all others n.s. ($ps>.51$). Follow-up one-sample t-tests indicated that only performance on dissimilar trials was different from chance, $t(14)=5.23$, $p<.001$ (similar: $p=.47$). The results suggest that infants formed a broad category representation that includes "geepees" and similar objects, but excludes dissimilar objects.

B20 Social Embodiment: Investigating the Emergence of Collaborative and Competitive Behaviours in Children

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The ability to socially interact with others emerges in the first years of life when children's motor skills begin to take shape. Collaboration and competition are examples of social interactions that require children to adapt their motor actions to others. Yet, little is known about how children's movement kinematics during collaborative and competitive behaviour emerge over development. Here, we addressed this question by testing preschool children (3- to 6-year-olds; n = 30) in a tower-building task in social and non-social contexts, while wearing motion trackers. In the non-social contexts, children built a tower individually at natural and fast speeds; the social contexts involved collaborating with an adult experimenter to build a tower and competing against the adult experimenter to place the first block of the tower. In some social trials, the adult experimenter demonstrated a behaviour incongruent with the task context (non-competitive slow movements during competition and fast, non-coordinated movements during collaboration). We found that children's movement kinematics were dependent on whether the context was social or not. We also found differences within the different social contexts when comparing the natural condition with the collaboration condition, the fast with the competition, and the collaboration with the competition. Importantly, children's kinematics were influenced by their social partner's behaviour during collaboration. Our findings provide new insights into the origins of social behaviour and how they relate to human movement.

B21 Are motor markers in children aged 0-2 associated with an increased likelihood of autism, Attention Deficit Hyperactivity Disorder, and/or Developmental Coordination Disorder? A systematic review

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Diagnoses of neurodevelopmental conditions (NDCs), including autism, Attention Deficit Hyperactivity Disorder (ADHD) and/or Developmental Coordination Disorder (DCD), are often delayed, typically until preschool age for autism and school age for ADHD and DCD, due to reliance on behavioural criteria and long waiting lists. Early motor markers hold promise for objective early detection of NDCs, enabling more timely interventions.1 Although motor difficulties are well-documented in NDCs2, there is limited consensus on specific early motor markers in children aged from 0 to 2 years. This systematic review aims to provide an overview of recent research on early motor markers associated with NDCs, adopting a transdiagnostic perspective that considers both condition-specific and shared markers. A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A systematic search of the PubMed and Web of Science databases was performed using relevant keywords encompassing NDCs, early identification, and diagnostics. Articles were screened, and data extracted, according to predefined inclusion and exclusion criteria. Eighteen articles (14 on autism, 2 on ADHD, 1 on DCD, and 1 on NDCs in a transdiagnostic perspective) published between 2012 and 2022 were included in this review. Several early motor markers associated with an increased likelihood of later NDC diagnosis were identified. Key shared markers across NDCs included poor motor coordination and control, delayed motor milestones, and atypical movement quality, such as asymmetry and hypotonia. Studies focusing solely on autism additionally identified atypical general motor behaviour and less mature fine motor skills as early markers. Motor markers were observed as early as three months for autism, six months for DCD, and one year for ADHD. Findings suggest that these early motor atypicalities may serve as early markers for later NDC diagnoses. However, the predominance of research on autism compared to ADHD and DCD highlights a need for broader, transdiagnostic, research. An updated analysis is planned with an expanded search to incorporate more recent evidence and strengthen the insights. While further validation is needed, the findings show that systematic observation of early motor markers holds promise as a key component of early identification strategies aimed at improving timely support and clinical care.

B22 Validating the Theory of Mind Scale in typically developing Dutch children and its relation to individual differences in language profiles

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A fully developed Theory of Mind (ToM) is essential for children's overall cognitive and social development. ToM refers to a child's ability to understand that other people have mental states, such as beliefs, desires, emotions and intentions, that may differ from their own perspectives. Wellman and colleagues have developed a ToM-Scale to capture this progression of ToM in early childhood (Wellman & Liu, 2004). This 5-item scale captures the sequence in which ToM understanding occurs and has been used to measure this progression in a variety of groups, showing that this sequence does not appear to be universal (Wellman et al., 2006, 2011; Wellman & Liu, 2004). There is also evidence to suggest that children show individual variation in ToM-performance that has been linked to their language abilities (Milligan et al., 2007). However, there are mixed results concerning this relationship. Ebert (2020) found that receptive language abilities predicted scores on the ToM task, but Brock et al. (2018) found expressive language to predict ToM scores. Additionally, individual differences also prove meaningful when we examine the social aspect of language namely, communicative abilities, such as pragmatic ability. For older children, pragmatic ability has been correlated with performance on ToM tasks (Babarczy et al., 2024). However, how younger children's pragmatic ability plays a role in predicting performance on the ToM-Scale has not been examined before. Firstly, we aim test the validity of this scale by examining how Dutch children (n = 385; age = 3-7 years) progress comparable to their English-speaking peers, using scalogram analysis (Guttman, 1950). Secondly, we aim to investigate individual differences by examining which language abilities and communicative abilities are related to ToM development. We have just finished data collection: We administered a Dutch adaptation of the ToM-scale to 385 typically developing Dutch children. Of this sample, we assessed age-normed language profiles for 334 children using the pre-CELF (Wiig et al., 2012) and the CCC (Bishop, 2013). While the pre-CELF offers 4 language indexes (receptive, expressive, semantics and syntax), the parental questionnaire CCC adds a general communicative, a social interaction and a pragmatic score. We will examine which language abilities relate to the performance on the ToM-Scale by performing a regression analysis. Similarly, relations between scores of the CCC and scores on the ToM-Scale will be examined. Results will provide insights into the development of ToM in a large sample of Dutch-speaking children and how this links to their language profiles.

B23 Movement quality in infants associated to Full-Scale-IQ indices at 6.5 years in children born very preterm

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Children born very preterm (born <32 gestational weeks) are at risk for motor and cognitive delays including intellectual developmental disorder and cerebral palsy (CP) (Pascal et al., 2018). Early identification of these challenges increases possibilities for timely interventions. According to theories on embodied cognition, motor and cognitive abilities are linked and dependent on each other during development (Adolph & Hoch, 2019). To investigate if motor abilities at 10 months (age corrected for prematurity) were associated to cognitive function at 6.5 years in children born very preterm. Motor assessments with the Structured Observation of Motor Performance in Infants (SOMP-I) were performed at 10 months in 94 of 113 very preterm infants in a population-based cohort, born 2004-2007 in Uppsala, Sweden (Montgomery et al., 2021). The assessments included standardized evaluation of level of motor development and quality of motor performance. Level of motor performance depicts what the child does, for instance if it can stand. Quality of motor performance refers to *how* the child moves, for instance stands on tiptoes. At 6.5 years, intelligence was assessed with the Wechsler Intelligence Scale for Children (WISC-IV) (n=78) (Kaul YF et al., 2021). The WISC-IV gives a Full-Scale-IQ, comprising indices for Verbal Comprehension, Perceptual Reasoning, Working Memory and Processing Speed. The Pearson correlation coefficient was used to assess strength of correlations, a p-value <.05 was considered statistically significant. Poorer motor quality at 10 months was significantly associated with lower Full-Scale-IQ, Perceptual Reasoning and Processing Speed scores (r = –.41 to –.31, p≤.006) at 6.5 years. No significant associations were found for Verbal Comprehension or Working Memory for the whole cohort. However, after excluding data from eight children diagnosed with CP, significant correlations with all the WISC-IV subscales, (r= –.25 to –.37, p-values .002-.034). were found. Level of motor development at 10 months was not related to WISC-IV results. Poorer motor quality at 10 months in infants born very preterm correlated with lower IQ, and the pattern was even more pervasive in very preterm born children without CP. The results suggest the importance of assessing motor quality during infancy in children born very preterm. The quality of movements might influence the possibility of exploring the environment, which provides the basis for development of other areas such as cognition. This is in line with the perspective of developing motor abilities as enabling since it provides opportunities for learning (Adolph & Hoch, 2019).

B24 Designing an Eye-Tracking Task to Measure Infants' Existing Category Knowledge

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Categorisation, the ability to parse the world into categories such as 'balls' and 'dogs', is a crucial aspect of early cognitive development. Infants as young as 4 months can learn a variety of categories from perceptual features alone (e.g., cat, car; Quinn et al., 1993; Quinn & Eimas, 1996). These studies tend to familiarise infants with a novel category by showing exemplars one after the other in close temporal succession. However, this is not reflective of real-world experiences and encounters that are characterised by long intervals between category exemplars, interleaving stimuli, and high variability in category exemplars. When 12-month-olds are presented with interleaved exemplars, more like the 'real-world', they are then unable to learn new category labels (Pomiechowska & Gliga, 2019). Therefore, typical lab-based familiarisation studies can only show us how children learn new perceptual categories in ideal situations. They tell us little about what categories children learn in the 'real-world'. We have developed an eye-tracking task that aims to explore real-world category learning by quantifying the category knowledge children have acquired prior to visiting the lab. We will collect data from children aged 10- to 20-months and assesses knowledge of 12 categories; these categories are expected to become familiar at varying points within this age range based on vocabulary norms (Wordbank; Frank et al., 2016). Using a Match-To-Sample paradigm, we will measure whether, when presented with an exemplar object, infants can identify a 'matching' (within-category) object against a 'distractor' (out-of-category) object (Kaldy et al., 2016). We will present findings from our pilot study (N=29, 11- to 20-month-olds) and discuss how they have influenced task design. While previous studies have focussed on metrics such as first looks and overall proportion looking, we will present time-course data which we believe is more insightful for exploring existing category knowledge. We will also discuss plans for the task, detailing our cross-sectional study investigating how existing category knowledge relates to specific knowledge of category labels, as well as to wider vocabulary and later language development.

B25 The role of limb size in visual proprioceptive synchrony preferences in 4-month-olds using a new virtual reality system: BabyMIRAGE

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The present study looks to explore infants' recognition of their own limbs through a new virtual reality system: BabyMIRAGE. This system allows for real-time manipulations of infants' legs and feet (through a live video feed, mirrors, and a monitor) presented within their actual bodily space, rather than at a distance or in a mirror. The experiment aims to establish if infants at 4-months of age show a preference for visual proprioceptive synchrony – live observations of their legs and feet that are synchronous with their own movements. A previous 1985 study from Bahrick and Watson found 5- but not 3-month-olds did show a synchrony preference of this nature when presented with videos of their feet outside of their bodily space. This experiment therefore addresses if this preference emerges at 4-months and is present within the new BabyMIRAGE set-up. It also explores if the size of infants' limbs mediates this possible preference. Results show infant preference for the delayed movements are consistent within individual participants but not between these participants. It is impossible to ascertain from this whether infants show preferences due to delay or for preference of either the left or right foot. Edits to the paradigm would allow for a follow-up study to potentially reveal the reason for the preference. However, the study was able to show these preferences were not mediated by increasing the size of infants' limbs – this could be linked to the maintained embodiment of larger hands during the rubber hand illusion in adults (Pavani & Zampini, 2007). Future studies could look to explore whether this finding is extended to reduction in limbs as well. The study's other aim of displaying a proof of concept for the new virtual reality system was achieved. With its high engagement and low attrition rates, BabyMIRAGE is shown to be an effective way to explore infant self-recognition. Future research could then look to investigate its use in other areas of developmental psychology.

B26 A Twin Study of Pretend Play and Child Development in Early Years

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The age of 2-4-years is a season of high pretence which also coincides with a variety of developmental milestones. With the inherent nature of early years development; individual differences are observed that are likely attributable to the joint influence of genes and the environment. However, the extent of contributions from genetic or environmental factors in early years developmental outcomes remains unclear. A study of twins was undertaken using data from the Twins Early Development Study (TEDS), a longitudinal cohort database designed to study genetic and environmental influences on individual differences in behaviour, mental health, and cognition. Data were obtained at ages 2 (*N* = 11,859), 3 (*N* = 11,569) and 4 (*N* = 15,5482) on parent reports of their child's cognitive ability, language ability, conduct problems, hyperactivity and prosocial behaviour. Phenotypic analyses showed that pretend play was significantly correlated with all variables. One-way ANOVAs assessed the effect of levels of pretend play as reported by parents (not true, sometimes true, certainly true) and found that highly imaginative children were rated highly in language ability, cognitive ability and prosocial behaviours and had fewer conduct problems and hyperactivity at all three developmental ages. Similarly, pretend play accounted for unique variance in each developmental variable at all three ages after controlling for SES and gender, except for hyperactivity at age 2. Genetic analyses using a Univariate 2-group Cholesky ACE twin model at each age group to account for additive genetic (***a***), unique environmental (e), common/shared environment (***c***), and non-additive genetic effects. On average, genetics accounted for 35%, 37%, and 45% of the variance in pretend play at age 2, 3, 4 compared to 47%, 40%, and 45% variance from the shared environment. The highest genetic effects were observed in conduct problems 52%, 50%, and 58% at ages 2, 3, 4 with shared environment accounting for 19%, 22%, and 11% variance The lowest genetic influence was for language ability with 23% variance at ages 2, 3, 4 with shared environment of 59%, 58%, 58%. It is clear that pretend play is associated with developmental outcomes during early childhood with similar patterns of individual differences. At least a third of variance in children's development is owed to genetic influences but the shared environment is more influential. The findings affirm that a child's home environment is just as important as their genetic disposition and future research should jointly consider both factors.

B27 Production of gesture in 4–5-year-olds: Task effects and the relation to cognitive abilities

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When produced in communication, gestures are involved when speakers retrieve words, recall events, and organize their messages (Goldin-Meadow & Alibali, 2013). At the same time, the production of gestures offers insight into individual cognitive differences (Alibali & Kita, 2010). However, little is known about how the production of gestures is related to cognitive abilities in early childhood, especially across different communicative tasks. This study examined co-speech gesture production in 66 German monolingual 4- and 5-year-old children across two communicative tasks and how these behaviors relate to nonverbal intelligence. In the first session, children participated in two tasks (correction vs. illustration): In the correction task, children interacted with a puppet demonstrating unconventional uses of everyday objects and were asked to correct the puppet's actions directly to the experimenter; in the followed illustration task, the puppet was removed, children were asked to describe the puppet's action to their caregiver who was unfamiliar with the demonstration. In the second session, children completed SON-R 2 ½ –7 intelligence test, assessing their fluid reasoning (RS) and visual processing (PS) skills. We compared the gesture types, gesture size, and speech production between two communicative genres. Linear mixed-effects models showed that children who spoke more also gestured more, particularly using iconic gestures. The communicative task significantly influenced gesture production: deictic gestures were more common in the correction task, while iconic gestures were more frequent in the illustration task. Together, these findings demonstrate not only that gesture and speech form a communication system, but also that gesture production is task-related, with children adapting their gestural strategies to match communicative context and its resources. Gesture size, however, did not differ between genres. Importantly, cognitive abilities were differentially linked to gesture types. Children with higher fluid reasoning (RS) used fewer iconic gestures but more deictic gestures. Visual processing (PS) did not significantly predict gesture production. This suggests that children with stronger reasoning skills may rely less on depictive support and more on referential strategies. They might choose referential strategies because of higher perspective-taking abilities (Kirk et al., 2015). In summary, this study demonstrated creative and flexible use of gesture in children, shaped by both communicative context and cognitive ability as children's gesture production varies by task demands and reflects individual cognitive profiles. These findings provide new insight into the developmental roots of multimodal communication and offer implications for understanding early language and social-cognitive development in infancy and preschool years

B28 A closer look at parenting stress: Parent, child, and contextual characteristics

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Parenting plays a crucial role in shaping children's wellbeing. It is a lifelong task that requires constant and intensive use of psychological resources and thus involves constant coping with stress. The present study examined a comprehensive perspective of parental stress based on Abidin's model (Abidin, 1992), including parental characteristics known in contemporary literature to have an impact on parental stress. Such a perspective has not been extensively studied and may enhance our understanding of the factors contributing to parenting stress by identifying the relationships between the components of the model. Six constructs were chosen to represent parent characteristics (i.e., child-centrism parenting style, self-efficacy, personality traits, and mentalizing ability), child characteristics (i.e. temperament), and context characteristics (i.e., marital satisfaction). The present sample consisted of 502 Israeli parents over the age of 18 who were married or in a committed relationship and had at least one child aged 3 to 5 years. Participants were recruited through a web-based survey company and completed self-report questionnaires dealing with parenting stress, parental child-centrism, parental self-efficacy, personality traits, mentalizing ability, child temperament, and marital satisfaction. A series of SEM models was performed to identify the associations between the components of the model. The results of the present study support Abidin's conceptualization of the factors contributing to parenting stress and indicate a central role for parental characteristics, especially self-efficacy and mentalizing ability. These results highlight the importance of two cognitive mechanisms reflecting parents' perceptions of their ability to fulfill the parenting role for parenting stress. The findings are discussed in view of Conservation of Resources theory.

B29 Tracking infant regulation across timescales: pupillary responses, sleep patterns, and temperament profiles

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Infant self-regulation depends critically on the maturation of the autonomic nervous system, which can be probed on a millisecond timescale through pupillometry (de Vries et al., 2023; Zeng et al., 2022). By tracking changes in pupil diameter in response to different light stimuli, we created indexes of tonic and phasic arousal and coregulatory capacity (de Vries et al., 2023). These micro-scale measurements were then linked to macro-scale regulatory processes—such as sleep (Ni & Teti, 2016; Ednick et al., 2009) and temperamental dimensions captured via parent reported questionnaires (e.g., Gartstein & Rothbart, 2003)—to chart how early autonomic adaptability manifests in longer-term behavioral and physiological stability. We here recorded eye tracking pupillometric data from 96 infants aged 6 to 12 months using a Tobii Spectrum and sustained red and blue light (4 trials á 30 seconds). The calculated pupillometric measures of autonomous regulation on short time scales (baseline size, pupillary light reflex, spontaneous fluctuations and ipRGC activity) were correlated with regulatory processes on larger time scales as assessed by parental report using the IBQ-R-VSF temperament scales (Negative Affect; Surgency; and Effortful Control dimensions) and sleep questionnaires (BISQ-R). The results show complex patterns of significant correlations between variables in line with previous literature, but also unexpected null findings. The results contribute to the current understanding of the continuity between rapid autonomic adjustments and the broader developmental trajectory of infant regulatory competence.

B30 Secondary altriciality as the foundation of human social behaviour

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Many authors have argued that foundations of human socio-communicative abilities can be explained by human's special cognitive abilities. For example, Sperber and Wilson (1995) suggest that humans have an innate module to recognise communicative intentions and interpret other's actions as intrinsically meaningful. This perspective is complimented by Natural Pedagogy which argues that young infants use a subset of communicative social signals to fast track social learning (Csibra, 2010). Other authors have argued that the foundations of human social abilities are based on processes of cultural learning that has shaped human social skills without attributing domain-specific cognitive abilities (Heyes, 2018). However, humans differ from other animals also through their unique ontogenetic trajectory. Human infants follow a unique developmental trajectory in which cognitively advanced neonates, capable of sophisticated multisensory integration (Cusack, Ranzato, & Charvet, 2024) grow up in a body that considerably limits their ability to explore their environment on their own (Rosenberg, 2021). Whereas other animals learn to explore the world directly, human infants learn to explore the world through others, providing a prior towards exploring the world through others (Kliesch, 2025). I want to explore how this developmental trajectory differs from our closest relatives and shapes how human infants explore their world.

B31 Gesture-speech integration in context: a longitudinal study of early multimodality

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In adult communication, gestures and speech are tightly synchronized in timing, meaning, and pragmatic function. This multimodal alignment emerges early in development, with gesture-speech combinations predicting key linguistic milestones such as vocabulary expansion (Murillo & Belinchón, 2012; Wu & Gros-Louis, 2014), the onset of two-word utterances (Butcher & Goldin-Meadow, 2000; Capirci et al., 1996; Özçalışkan & Goldin-Meadow, 2009), and morphosyntactic development (Capobianco et al., 2017). However, the origins of these early multimodal behaviors, and the pathways through which infant motor and vocal activities become integrated into purposeful communicative acts, remain underexplored. This study explores the developmental trajectory of gesture-speech integration during the first year of life, focusing on the rhythmic and vocal foundations of early triadic interactions. We conducted a longitudinal study with nine infants (5 boys), observed monthly from 2 to 12 months in naturalistic parent-infant interactions. Video recordings were analyzed using ELAN to code vocal and motor behaviors with fine-grained temporal precision. Our analysis focused on developmental changes in the frequency, duration, and timing of these behaviors, along with their gradual coordination in triadic multimodal exchanges. Findings reveal progression from uncoordinated motor and vocal actions to increasingly synchronized multimodal communication, eliciting contingent responses from caregivers. The results highlight the foundational role of rhythmic and vocal coordination in the emergence of multimodal communication, opening new avenues for research into how multimodal communication unfolds in context.

B32 Monkey See, Monkey Do? Exploring Naturalistic Neonatal Imitation in the First Two Months

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We first examined whether a given infant behaviour was linked to the same adult behaviour, in terms of total frequencies within a session. Poisson regressions revealed that infants were more likely to produce MO in sessions when mothers also produced the same behaviour at a relatively high rate. However, there was no correspondence for tongue protrusion or vocalization. Next, we tested whether infants were more likely to produce a given behaviour immediately after the mother produced it using logistic regression. Only infant MO was predicted by the occurrence of the corresponding maternal behaviour in the preceding 10 seconds. Finally, we tested predictions of the experienced-based account by examining the relationship between infant imitation and maternal imitation in earlier sessions. Given the results of the first two analyses, we focused on MO. We found no association between infant and maternal MO imitation. In sum, we found that infants selectively reproduced MO, which could be taken as evidence for imitation. However, as we observed this for only one behaviour, our results do not strongly suggest that infants are born with robust imitation abilities. Our findings could suggest that infants begin to build their repertoire of imitative behaviours in response to maternal behaviour, as mothers frequently modelled MO. However, we did not observe that infants' tendency to imitate relates to being imitated themselves, which is key to experience-based mechanisms. Overall, our findings suggest that infants' emerging behavioural skills build on caregiver input rather than innate capacities.

B33 Parents' attitudes and early parent-child interactions: Insights from a language-generic intervention on multilingual families

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Differences in infants' language input, shaped by parents' beliefs and understanding of language development (Hembacher & Frank, 2020), can account for disparities in early language outcomes (Golinkoff et al., 2015). Parent-focused interventions in monolingual and homogeneous bilingual families (e.g., Spanish-English), showed intervention-related changes in parents' language input to their child, increases in child vocalisations (Suskind et al., 2016), and in vocabulary growth (Huber et al., 2023). This study tests the effectiveness of a language-generic intervention involving more diverse, multilingual, multicultural, and low socio-economic status families. Parents of 2-month-old infants from Norway's most immigrant-dense district were randomly assigned to a language intervention or an active control group. The intervention group met individually with a language pedagogue at 4 and 8 months, and in groups at 6 and 10 months. The active control group had group meetings at 4 and 8 months with a focus on motor and general child development, but language. Inclusion of the active group helps isolate the effects of the language intervention from those of general parental support, setting this study apart from prior research (e.g., Huber et al., 2023). This preregistered longitudinal project explores whether a language-generic parent intervention can change parental attitudes and beliefs about parenting and their role in early language development, ultimately fostering more language-supportive environments. The study investigates potential intervention-driven shifts in parental attitudes (using the Early Parental Attitudes and Beliefs Questionnaire (EPAQ; Hembacher & Frank, 2020)) at 2 and 12 months, as well as in the quantity and quality of child-directed speech in audio recordings of parent-child interactions at 8 and 12 months, and examines possible associations between these factors. Analyses of language-related EPAQ data from 37 participants showed a time-based change in parents' attitudes toward Talking to Children ($p = .049$), regardless of group. There were no changes in Book Reading. However, the intervention group displayed an attitude shift toward less infant-directed speech ($p = .033$). Marginal Time x Group interaction appeared in Slow and Clear Speech ($p = .056$), although follow-up pairwise comparisons were non-significant. Regarding the quality and quantity of parental speech, we expect group differences in the proportion of child-directed input, pitch, and pitch range, growing with the intervention. A positive relation between parental attitudes and language input is anticipated, with time reinforcing this link in the intervention group. While waiting for the audio recording analyses to confirm these predictions, the results will be presented at the conference.

B34 Effectiveness of Windowed Cross-Lagged Correlation in Analyzing the Coordination and Development of Early Infant–Mother Interaction: A Pilot Study

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The early development of dyadic coordination during interaction arises from repeated multimodal experiences within the system of parental routines (Thelen & Smith, 1994). Traditionally, it has been studied through event-based approaches, which presents challenges, including the definition of meaningful units and the discretization of interaction into successive binary-coded actions (e.g., Bourjade et al., 2023). The aim of this pilot study is to assess the utility of windowed cross-lagged correlation (WCLC) in analyzing the coordination and development of infant-mother interactions through the analysis of body movements before 6 months of age. We recorded 3- minute interactions between four mother–infant dyads using a motion capture system at 1, 3, and 6 months. Reflective markers were placed on the mother's head and wrist, and on the infant's head, wrist, and ankle. WCLC was applied to the instantaneous velocity of each marker using RStudio and the *rMEA* package (Kleinbub & Ramseyer, 2020). Data analysis is ongoing but preliminary findings showed that correlations dynamically changed throughout the sequence, with the leading role alternating between mother and infant. The leading partner varied by dyad, with either the mother or the infant more frequently leading the interaction. Furthermore, the infant body parts showing the highest correlation peaks varied between dyads and across the time points. During early parent–infant interactions, the association patterns between partners' body movements are non-stationary, with changes in which partner is leading the other. WCLC appears to be a valuable method for analyzing early dyadic coordination, as it captures the dynamic and emergent nature of interactional patterns. Continuous analysis offers a nuanced view of developmental changes in communicative engagement and highlights differences in the parental routines within which infants develop (Jover & Gratier, 2023).

B35 Does Maternal-Fetal Attachment Predict Postpartum Relatedness, Breastfeeding and Infant Temperament?

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Maternal-fetal attachment (MFA) disturbances may indicate postpartum relational difficulties as reported by the mother. However, within community settings (excluding mothers experiencing mental health difficulties), the specific associations between prenatal disturbances and postnatal behaviours, such as maternal sensitivity, physical closeness, breastfeeding, and infant temperament, remain poorly understood. Additionally, whether MFA (often referred to as prenatal bonding) is a unitary (or multi-component) construct has been debated but rarely tested. Objectives: (1) To examine whether MFA is linked to observed and reported mother-infant outcomes in the first postnatal year; (2) To determine whether a unitary or muti-component construct of MFA is most predictive of mother-infant outcomes. The established Mother-Fetal Attachment Scale (MFAS) was completed by pregnant women in their third trimester recruited via NHS antenatal clinics, after screening out probable depression. At four months postpartum, mother-infant play interactions (N = 80) were recorded and blind coded for maternal sensitive responsiveness using the Manchester Assessment of Caregiver-Infant Interaction. Mother-reported pregnancy outcomes, breastfeeding duration, mother-infant relations, and infant temperament data were also collated. A subsample (N = 30) was followed up at eight months postpartum, with frequency of maternal affiliative touch and mother-infant proximity during mother-infant interactions blind coded. Total MFAS statistically predicted mother-reported infant warmth towards her, higher infant orienting-regulatory temperament scores, and - marginally - longer breastfeeding duration (p=0.054), measured at four months. In the eight-month subsample, MFA was associated with observed mother-infant proximity (p=0.007). Specific MFA factors yielded distinct predictive associations: The *'Empathising with the unborn infant's thoughts and feelings'* factor significantly predicted maternal sensitive responsiveness at four months. The *'Attributing characteristics to the unborn infant'* factor significantly predicted 4-month infant orienting-regulatory temperament scores. The *'Anticipating and fantasising'* factor was only marginally linked with infant orienting-regulatory and observed proximity. Findings largely support MFA as a unitary construct, with moderate associations with both observed (mother-infant physical closeness) and reported (infant warmth, orienting/self-regulation, and possibly breastfeeding) affiliative outcomes. However, maternal empathising - a component of MFA - uniquely predicted maternal sensitivity. This aligns with the idea that maternal bonding (a mother's affectional tie to the infant) is necessary but not sufficient for maternal sensitivity (how a mother responds to the infant) and secure attachment. Maternal empathic cognitions about the unborn child is a potential target for prenatal interventions aimed at improving infant attachment security, particularly given its links with breastfeeding and maternal sensitivity.

B36 Unpacking directiveness in interactions of children with and without hearing loss: a mixed methods study

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Previous research suggests that parental directiveness differs across hearing children (HC) and children with hearing loss (NH). Yet operationalisations of directiveness mostly take an individualistic approach locating directiveness at the utterance level rather than the level of social action. We take an interactional approach, in which social actions are co-constructed in collaboration. This study, examines the sequential organisation of directives in these populations to explore how parents construct directive sequences, how children receive them and why specific caregiver strategies may occur. We used the Ambrose et al. (2016) corpus with video recordings of free-play interactions of NH and HC children. We analysed 15 dyads from each group at 36 months. We coded directives in terms of the social actions they were pursuing (orders, proposals, requests, suggestions). We further coded directives for whether they were prompts for attention or action. Importantly using an interactional approach, we coded whether children complied to directives and how non-compliance was responded to by the caregiver. This gives us the opportunity to explore the functions of directives in the interactions of these different populations. Confirming previous research, we found that in dyads with NH children directives were used significantly more (M=15.55, SD=6.60) than in HC dyads (M=9.71, SD=4.79); t(28)=-2.772, p=.010. Yet when delving deeper into the different qualities of directives we found no significant differences in the types of directives used across populations or the action they pursued in interaction revealing similarities in use. Regarding children's responses to directives, we found an interaction between hearing status and compliance with NH exhibiting more non-compliance to directives (M=36.47, SD=16.42) than HC (M=20.96, SD=11.45, p=<.001). Here qualitative analyses provided evidence that NH children were made accountable for not complying, whereas non-compliance in HC was not acted upon. Additionally, we found a significant interaction effect between hearing status and task completion F(1, 27)=5.24, p=.030 revealing that following child non-compliance, mothers of NH children completed tasks more (M=36.32, SD=21.95) than mothers of HC (M=15.43, SD=21.91, p=<.001). Here, qualitative analyses further showed that non-compliance in HC was treated as a choice, whereas in NH children as a potential lack of understanding or ability, prompting mothers to interfere and complete the tasks for the child. Our analyses reveal how the use of and response to directives provide insights into parents' perspectives of their child's ability and into children's potential experience of agency in interactions.

B37 How do health visitors (HVs) perceive their role in the infant feeding decisions of young expectant parents?

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To explore HVs perceptions of their ability to influence the feeding decisions of young expectant parents, particularly at the antenatal contact. To develop further evidence for government decision makers regarding the importance of the antenatal contact, particularly for vulnerable groups of expectant parents. A small, qualitative research project utilising semi-structured interviews. Five registered, practicing, UK based HVs were interviewed. Thematic analysis was conducted on the interview transcripts in order to develop themes. Data collection took place in the UK in 2021. The ongoing pandemic meant online interviews were used to limit risks associated with meeting face-to-face. Five registered, practicing, UK-based HVs were recruited using social media. All the participants were female. Two of the five were previously known professionally by the researcher. The HVs interview reported finding working with this client group enriching and satisfying. They expressed how competing influences on young expectant parents can limit engagement with evidence-based advice from health care practitioners. The therapeutic relationship remained a key priority for the practitioners interviewed. Three key themes were identified; 'The Role of the Health Visitor', 'The Antenatal Contact and Feeding Discussions' and 'Barriers to Advice Adherence and Alternative Sources of Advice'. Health visitors feel that they have an important role to play in influencing the infant feeding decisions of young expectant parents and that the antenatal contact is an ideal opportunity to discuss breastfeeding with this group. However, young expectant parents often seek information from alternative sources such as peers, mothers, grandmothers, partners, the internet and social media and the advice and information offered by these sources may not be in accordance with the evidence-based advice offered by the health visitor and other healthcare professionals. HVs value the antenatal contact and view it as an ideal opportunity to develop the therapeutic relationship. More research is needed to develop the evidence-base regarding the timing of the antenatal contact and feeding discussions with young expectant parents. Further research on developing self-efficacy in HVs would be beneficial in order to create strategies to further improve the key antenatal contact.

B38 The language and executive functioning skills of 4-year-old children born-in-lockdown: Preliminary data from the BICYCLE study

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Evidence suggests that children growing up during COVID-19 pandemic lockdowns may be experiencing long-term impacts on their language (Zuniga-Montanez et al., 2024) and executive functioning (Hendry et al., 2022; Lopez et al., 2024). Children born during lockdowns also faced unprecedented disruption to their early social and communicative experiences in their first year of life. Studies have shown this cohort exhibit poorer language abilities (Pejovic et al., 2024) and were slower to learn early social communication skills such as pointing and waving during infancy and toddlerhood (Byrne et al., 2022). However, less is known about their executive functioning abilities, particularly as they are now approaching school age. The Born in Covid Year – Core Lockdown Effects (BICYCLE) study investigates the language and executive functioning skills of children born in England during the first strictest lockdown (March to June 2020). This study recruited 200 four-year-old children 'born-in-lockdown' and they were administered standardised assessments and parent-report questionnaires. This poster will summarise findings on expressive and receptive language abilities, non-verbal IQ scores and questionnaire data on executive functioning and motor skills. Comparisons between this group of children born-in-lockdown and age-matched population norms will be reported. This poster will present new findings on the long-term impact of early-life lockdowns on children's language and executive functioning, highlighting areas where additional support may be needed.

B39 Early intervention, measurable impact: A big data analysis of the short- and long-term developmental benefits of early psychosocial intervention

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Infant psychopathology often presents as somatic-behavioral symptoms such as persistent crying, irritability, sleep disturbances, and eating disorders (Winsper & Wolke, 2014). This can result in excessive pediatric services use and socioemotional challenges later in development. While psychosocial interventions for infants and young children show promise in enhancing socio-emotional development, longitudinal studies in this area are scarce (Lyons-Ruth et al., 2017). Aim: To analyze the HMO's dataset and determine if early psychosocial intervention (at ages 0 to 6) reduces pediatric visitations during infancy and enhances socioemotional resilience in later childhood. Hypotheses: (1) Infants receiving the intervention will show decreased over-utilization of pediatric services (2) Those who received early intervention will be less likely to be referred to mental health during late childhood (ages 7-18). A dataset of 25,933 Israeli children born between 2010 and 2022 with no known developmental or chronic physical disorders was analyzed. Of these, 6,503 received treatment at infant mental health clinics (median of 10 sessions); 6,503 propensity-scores-matched were not referred and served as controls; and 12,927 were referred but dropped out after 1-2 sessions. Repeated Measures ANOVA revealed a significant decline in pediatric visits following involvement in the intervention with high-service users (1 *SD* above average) decreasing from 27.2 visits (*SD* = 10.3) to 15.4 (*SD* = 11.9) (F (1,7435) = 306.72, $p < .001$, $\eta 2$=0.01). A fully parametric survival model adjusting for child age, gender, SES, and demographic factors using the control group as the reference showed that both the treated (B = 0.03, SE = 0.00, z = 11.13, $p < .001$) and dropout (B = 0.04, SE = 0.00, z = 15.13, $p < .001$) groups exhibited significantly lower hazard of event occurrence- late childhood referral- with hazard ratios (*HR*) of 0.78 for treated and 0.75 for dropouts, indicating delayed event-occurrence (i.e., delayed mental health referrals) in both groups relative to the control. Early childhood intervention can relieve pressure on pediatric healthcare services in the short term and reduce the occurrence of repeated mental health referrals during childhood and adolescence. This demonstrates the positive effect that early psychotherapeutic interventions can have on children's socioemotional development and well-being.

B40 Application of Machine Learning to Predict Subsequent Childbirth Intentions

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Introduction: This study aimed to establish a machine learning model to predict subsequent birth intentions using the Korean Early Childhood Education and Care Panel Data, evaluate its performance, and identify multiple determinants. Additionally, recognizing that the impact of predictive variables may differ based on maternal age, we divided the data into three groups based on maternal age, applied them to the model, and examined the importance of the predictive variables affecting each group. In the first year (2022) of the Korean Early Childhood Education and Care Panel, 112 mothers in their 20s, 987 mothers in their 30s, and 99 mothers in their 40s (total of 1,198 individuals with partners) participated. For machine learning application and performance verification to predict subsequent childbirth intention, the study used the Python package system Anaconda and its Orange 3.38.0, library. The analysis process employed supervised learning models, such as Random Forest, AdaBoost, and Neural Network, to train the predictive and outcome variables. Additionally, a stacking ensemble technique (combining models) was applied to achieve optimal performance. First, the models (Random Forest, AdaBoost, Neural Network, and Stacking) used to predict subsequent childbirth intention demonstrated a prediction accuracy exceeding .70 based on the weighted average (F1) value. The best-performing models were stacked for the overall group, Random Forest for the 20s group, Neural Network for the 30s group, and both Random Forest and Neural Network for the 40s group. Second, the importance of predictive variables for subsequent childbirth intentions differed across groups, revealing distinct factors influencing intentions within each group. For instance, in the 20s group, fathers' participation in childcare was a significant factor, unlike in the other groups. In the 30s group, maternal age emerged as a significant factor, while it was not significant in the other groups. For the 40s age group, subjective socioeconomic status was identified as a significant factor in the other groups, despite its lack of significance in the other groups. A machine learning model to predict subsequent childbirth intention was developed using methods distinct from those in related studies. The age-group analysis results underscore the potential to address common issues across groups effectively, aiding in the development and implementation of more targeted policies. Furthermore, by enhancing mental health support for mothers and enhancing childcare resources, empirical data can be leveraged to encourage subsequent births.

B41 A qualitative exploration of parents' experiences of infant and toddler sleep and feeding during the UK COVID-19 lockdown(s).

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COVID-19 restrictions had a significant impact on family life, including daily activities and routines. This study aimed to explore the impact of the COVID-19 pandemic on children's sleep and feeding behaviours, through undertaking reflexive thematic analysis of parents' open-text box responses to survey questions related to their child's sleep and feeding practices during COVID-19 restrictions. Six hundred and ninety-one parents of children aged 0-24 months old who were living in the United Kingdom completed an online questionnaire between 14th December 2020 and 15th January 2021. Results suggested that the pandemic resulted in specific contemporaneous changes to feeding and sleep practices. Specifically, for feeding there were positives around an extension to breastfeeding, but this was alongside a negatively perceived increased breastfeeding demand. For sleep practices, parents reported primarily negative implications of poorer child sleep and an increase in reactive bedsharing. Overall, there were some positive implications on general practices which impacted both sleep and feeding, including providing the opportunity for parents to make beneficial adjustments such as to their routines. However, there were also clear negative implications around practical challenges and a lack of formal and informal help and support. This is the first study to explore parentally reported reasons and motivations for changes to child's sleep and feeding practices. Findings have implications beyond the pandemic as they provide an example of the ways in which parents, if afforded with favourable circumstances such as additional time, flexibility, a reduction in perceived pressure and social stigma may seek to change their child's sleeping and feeding practices. In addition, specific child sleep and feeding behaviours which parents struggled with and may benefit from additional help and support in a post-pandemic context to contribute to children's development and well-being are highlighted.

B42 Tuning into Touch: Infant Somatosensory Processing Revealed through Impulse Response Functions

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Little is known about how infants process tactile sensations, including the specific neural oscillations involved and the developmental trajectory. Studies in adults show the essential of beta rhythm (15–30 Hz) in passive tactile perception. However, we still lack an understanding of when and how this rhythm emerges during infancy. Our research aims to fill this gap using impulse response functions (IRFs). IRFs help us identify where, at which frequency, and how rhythmic brain responses follow sensory inputs.In our ongoing study, we measure EEG from two groups: 20 infants aged five months and 20 infants aged nine months. Each infant experiences random amplitude-modulated white noise tactile stimulation (150 Hz carrier frequency), lasting 6.7 seconds per trial, applied to their palms through vibrotactile buzzers. Infants sit comfortably on their parent's lap, facing the experimenter, who uses toys, music, or bubbles to keep the infants calm. Each hand receives 50 trials. EEG activity is recorded with a high-density 128-channel EGI system using average referencing. We cross-correlate the EEG data with the tactile stimulation sequences to calculate IRFs. These IRFs help us tune the neural resonance patterns specific to tactile processing. Using time-frequency analyses, we examine three key aspects: the reproduced resonant frequency, the duration of oscillations, and their spatial distribution across the somatosensory cortex. We also compare these properties between younger and older infants, investigating developmental changes. We hypothesise that infants' resonant frequencies will be lower than adults' and will gradually increase with age. We anticipate clearer and slightly higher-frequency beta oscillations in nine-month-olds compared to five-month-olds, but still below adult levels. By calculating impulse response functions (IRFs), our study offers insights into infant sensory processing, particularly in understanding the early developmental stages of human tactile perception during the first year of life.

B43 *Let's pretend*: The concurrent and longitudinal relation between toddlers' pretend play and executive functioning

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Executive functions are higher-order cognitive processes that allow conscious control of thoughts, actions and emotions. They emerge gradually in early childhood and have been identified as important predictors of children's overall development and, thus, important targets of early interventions (Stucke & Doebel, 2024). Pretend play, which engages children's imagination and creativity, has been posited to benefit children's executive development (Gleason & White, 2023). Pretend play requires children to separate between pretend and reality (e.g., a pen, an aeroplane), hold in mind these dual representations and be able to flexibly choose between the two. As such, executive functions are necessary to engage in pretend play, while at the same time, pretend play provides a context in which to practice and refine these skills. A recent meta-analysis from our lab identified a positive, significant association between executive functions and pretend play in early childhood, yet also identified a lack of studies focused on earlier developmental stages, such as toddlerhood (Constien et al., under review). Moreover, potential moderators of this association have remained largely unexplored. Aims: This study seeks to follow our meta-analysis by conducting an empirical concurrent and longitudinal exploration of the relation of pretend play and executive functions in the toddlerhood period using a pre-registered prospective, longitudinal study design. It will address the following aims: (1) examine the developmental progression of pretend play during the toddlerhood period, (2) examine the concurrent and longitudinal relation between toddlers' pretend play and executive functioning, and (3) examine the moderating role of parenting behaviours, including autonomy-support and playfulness, on the relation between toddlers' pretend play and executive functioning. The sample will consist of 149 typically developing toddlers between 20 and 28 months and their parents. They will be invited to the lab at Time 1 and asked to return 12 months later for a follow-up at Time 2. Collected data will include performance-based tasks of executive functioning and pretend play, observational measures of pretend play and parental behaviours, as well as questionnaires of toddlers' language development, sleep quality and parental executive functioning. Regression analyses will be used to test the pre-registered hypotheses. We will be able to present preliminary, concurrent results from this study at the conference. Findings from this study are expected to contribute to our theoretical understanding of the developmental contributions of play, enhance the understanding and promotion of toddlers' executive functions and inform the development of play-based interventions.

B44 Evaluating the Role of Temporal Structure in Early Category Learning: The Influence and Generation of Clustered Schedules in Toddlerhood

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Natural events rarely unfold at perfectly spaced intervals (spacing; Billman, 2011), nor do they occur just once and never again (massing; Vázquez et al., 2006). Instead, many aspects of daily life—from environmental phenomena like rainfall to human actions such as using a spoon—demonstrate clustered temporal patterns: short bursts of repeated events interspersed across time. This temporal clustering can be quantified as "burstiness," with positive values reflecting tightly clustered activity and negative values indicating more uniform, either spaced or massed, patterns (Goh & Barabási, 2008; Kim & Jo, 2016). While adult learning seems to benefit from specific timing schedules, little is known about their impact or self-generation in early development. Although recent observational findings suggest that parents' clustered speech drives better word learning in toddlers (Slone et al., 2022), causal and mechanistic evidence remains scarce. The present work addresses this knowledge gap through two eye-tracking studies with 13- to 15-month-old toddlers. We pursue three questions: (1) When experimentally controlled, do clustered (high burstiness) schedules enhance category learning compared to massed or spaced (low burstiness) intervals? (2) What temporal structures do toddlers generate themselves when allowed to direct their learning? (3) How does the effectiveness of self-generated schedules compare to experimentally imposed ones? In Experiment 1, toddlers experience novel object categories according to massed, spaced, or clustered presentation schedules, enabling within-subject comparisons. Experiment 2 allows toddlers to actively direct the timing of exemplar presentation using gaze-contingent eye-tracking (see Altmann et al., 2025). Across both experiments, learning is assessed via a novelty preference task comparing in-category exemplars to similar yet distinct out-category exemplars. Crucially, we quantify each child's exposure schedule using measures of burstiness and mean inter-trial interval, relating these to learning outcomes. We hypothesize that clustered timing will promote superior category learning (H1), that children will self-generate schedules along a burstiness continuum (H2), and that there, as well, higher burstiness will predict greater learning efficacy (H3). Linear mixed-effects models and regression analyses will evaluate these predictions, using both categorical and continuous predictors of temporal structure. Whether or not clustered schedules confer learning advantages, this research will illuminate how toddlers structure their own learning experiences and how different temporal structures shape cognitive development. Our findings promise to inform theories of learning as well as the design of developmental studies and early educational interactions.

B45 SMARToYS: Studying the Effect of Sensorimotor Play on Early Cognitive Development

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Infants and toddlers spend countless hours playing, handling, and manipulating toys. How do these daily activities shape cognitive development? Traditional research in laboratories argues that children's sensorimotor experiences set the stage for the emergence of executive function (EF), such as attention, planning, and inhibitory control. By using creative "low-level" sensorimotor problems (e.g., navigating obstacles or using tools), researchers showed that EF begins early in life and improves with age and experience (Franchak et al., 2024; Mendez et al., 2024; Yang et al., 2023).Despite the central role of sensorimotor play in early childhood, questions about how it directly scaffolds the development of EF remain open. Data are largely descriptive, and causal evidence is limited. Here, we aim to address this gap by investigating the *causal impact* of sensorimotor play on development through a controlled longitudinal intervention in nursery settings.In this study, 3- to 4-year-old children engaged in three consecutive days of guided play with either physical toys or digital iPad versions of the same toys. Both sets of toys have been carefully selected to support core cognitive skills, including attention, motor planning, and mental rotation. During the sessions, video recordings and wearable head-mounted eye-trackers captured children's engagement with the toys and attention profiles.
To assess developmental outcomes, a battery of cognitive measures including memory, inhibition, attention, mental rotation, and action planning was administered before and after the sensorimotor play intervention. Moment-to-moment sensorimotor experiences during play, problem-solving strategies, attention, and social interactions were analysed in both the iPad and physical toy intervention groups to investigate how different play experiences influence young children sensorimotor engagement, reasoning, attention, and social interaction patterns. Preliminary results will illustrate how these factors, in turn, are linked to the development of EF, as measured by our cognitive assessments. Our findings set the foundations for a causal link between sensorimotor play and EF development, which is necessary for understanding how sensorimotor play contributes to key developmental cascades.

B46 The Effect of Popularity on Children's Curiosity

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Previous research has shown that curiosity can direct children's knowledge acquisition, learning and retention (Ackermann et al., 2020, 2024; Shah et al., 2018). One of the strategies infants use to acquire information about the world around them is social learning. While there is a wealth of literature focusing on caregiver input (Ishikawa & Itakura, 2024; Tamis-LeMonda & Masek, 2023), the role of peers in influencing a child's interests remains heavily understudied. There is some evidence to suggest that children pick up preferences (toys, clothing, dietary choices) from peers but rely on adults for learning new skills (Wood et al., 2013). However, another study found that children show no preference between adult, peer and infant helpers in a problem-solving task (Raport et al., 2024). Most studies on social conformity with children have used perceptual judgement tasks with a correct and incorrect answer (Haun & Tomasello, 2011; Hellmer et al., 2018), and adult models, potentially confounding the motivation behind children's behaviour. This highlights a gap in our understanding of how peer preferences can influence a child's interests. In adults, Dubey et al. studied the effect of popularity on people's curiosity for everyday scientific questions, using the number of upvotes (as on the online platform Reddit) as an indicator of popularity (Dubey et al., 2021). Inspired by this, our primary aim is to understand how popularity can influence children's curiosity as measured by their choices. We also want to study how this changes across development as they begin to interact more with peers, so we aim to collect cross-sectional data from three-year-olds to ten-year-olds. We will measure children's choices and dwell times when they are provided with social information about two stimuli ("many children saw this!" vs "very few children saw this!"). In addition to verbal cues, we will display a scale of thumbs ups with the number filled acting as a visual indicator of popularity. As a follow up, we intend to add a 'cost' for curiosity in terms of waiting time before viewing the stimulus, where children have to wait longer for the more popular stimulus. Since we hope to begin at the age of three, we are developing a pilot study to validate the visual scales that indicate popularity to ensure children's comprehension. We hypothesise that younger children will choose the more popular stimulus and that this effect will become stronger as they age.

B47 Infants' Early Sense of Moral Desert: Expectations of Deserved Outcomes

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People believe that bad individuals deserve misfortune, whereas good individuals deserve good fortune. Moral desert, the idea that individuals should receive consequences reflecting their moral actions, plays a fundamental role in social judgment and decision-making (Feinberg, 1970; Lerner, 1980). However, a critical question remains: do infants have a sense of moral desert? From an early age, humans exhibit incredible capacities for social evaluation and moral reasoning. Previous research has shown that in their first year, infants evaluate agents based on their moral behavior, preferring prosocial over antisocial ones (Hamlin et al., 2007, 2010; Kanakogi et al., 2017). They also build expectations about how others should interact with them accordingly (Hamlin et al., 2011; Kanakogi et al., 2022). By 14 months of age, infants treat an agent's moral character as a stable trait, predicting that an agent's future behavior will align with their past actions (Surian et al., 2018; Gill & Sommerville, 2023). However, it remains unknown how infants respond to outcome events that occur outside of social contexts. In real-world scenarios, fortune and misfortune often occur unpredictably with no clear external enforcement. If infants have an early sense of moral desert, they would consistently expect an individual to receive their deserved fortune, even in non-social contexts.This study investigates whether 14-month-old infants expect moral actions to lead to deserving naturally occurring outcome events. The study comprised two stages: the Event Stage and the Outcome Stage. In the Event Stage, infants were assigned to either the Helper or Hinderer condition, where they saw a protagonist struggling to open a box and an agent who either helped or hindered. In the Outcome Stage, infants saw the same agent experience either a positive (i.e., strawberries falling nearby) or a negative (i.e., stones falling and hitting) outcome. We used a Violation-Of-Expectation (VOE) paradigm and measured infants' looking time in the Outcome Stage. We hypothesized that infants would form an impression of the agent's morality during the Event Stage and then expect the agent to receive a deserved outcome in the Outcome Stage (e.g., a helper receiving strawberries, or a hinderer being hit by stones). Specifically, we predict that if infants have an early sense of moral desert, they will look longer at an undeserving outcome event compared to a deserving outcome event. We will report preliminary results at the time of presentation.

B48 CUTIE Project: Linking Curiosity and Toddler-Infant Executive Functions in Early Childhood

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Curiosity as a key driver of learning remains poorly understood particularly in early childhood, despite its significant impact on learning and life outcomes (Kidd & Hayden, 2015). Current theories suggest that curiosity arises from recognising knowledge gaps and the ability to seek information to close them (Loewenstein, 1994). This ability relies heavily on executive functions like planning, attention control, and problem-solving, implying that, from this perspective, young children with their limited executive function skills may lack the capacity for curiosity. Yet, this assumption contradicts evidence for curiosity-driven exploration already in early infancy (Gibson, 1988), highlighting a critical gap in our understanding of how curiosity develops from infancy into early childhood, and the role of emerging executive function in supporting curiosity development. Executive functions emerge early in infancy and develop rapidly during toddlerhood (Hendry et al., 2016) alongside significant reorganisation and changes in prefrontal cortex (Fiske et al., 2024). The rapid development of executive functions and the prefrontal cortex may underpin a shift in curiosity-driven behaviours from broad exploratory behaviours in infants to more focused and goal-directed information-seeking in toddlerhood (Chen et al., 2022; Poli et al., 2024). No research has systematically examined how executive function and prefrontal cortex development shape curiosity. Therefore, this project aims to investigate the roles of the prefrontal cortex and executive function in developmental changes in curiosity-based behaviours from infancy to toddlerhood. We will test 9- to 12-month-old infants and 18- to 21-month-old toddlers with in-lab child-friendly tasks including gaze-contingent exploration tasks, executive function tasks and a habituation task for assessing exploratory behaviours and executive functions. In addition, we will also assess individual differences via parental reports with the Early Executive Functions Questionnaire (Hendry et al., 2021) and the Infant and Toddler Curiosity Questionnaire (Altmann et al., 2025). We will combine methods including naturalistic observation, eye tracking, and functional near-infrared spectroscopy (fNIRS) to measure children's behavioural and neural responses. We predict that changes in prefrontal cortex activation and improved executive functions are linked to the transition from broad exploration to focused exploitation. General linear models will be used to evaluate the effects of executive function, prefrontal activation and age on curiosity-based exploratory behaviour. Correlations between questionnaires and curiosity-driven behaviour will be analysed. This study will be the first to research how early development of executive functions and the prefrontal cortex shape the developmental changes in curiosity-based behaviours from infancy to toddlerhood.

B49 Curiosity-based exploration in infancy and toddlerhood

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This study will examine children's curiosity-based exploration, specifically focusing on whether they seek to resolve it. Previous research has demonstrated that adults (Nicki, 1970) and adolescents/older children (Fandakova & Gruber, 2021) seek to resolve their curiosity, induced by blurred images and trivia questions. However, although infants are curious and explore their world (Bazhydai et al 2019), these curiosity resolution behaviours have not been replicated in infancy research (Chen et al, 2022). The current study will stimulate infants' (aged 8-months) and toddlers' (aged two years) curiosity by presenting them with a blurred object on screen. Using Gaze Contingency, children will choose what they see next: the clear resolution of the previously blurred object or a clear new object. Past research has used Gaze Contingency with these age groups (Poli et al 2024; Wang et al, 2012). Trait curiosity will also be examined in relation to these behaviours, measured by a parental report questionnaire. Our first hypothesis is that toddlers will choose to perceive clear resolution images more than clear new images, significantly more than infants. Our second hypothesis is that infants and toddlers will look longer at clear new images than clear resolution images, with toddlers' looking times being significantly shorter than infants'. Data will be analysed by comparing how many times children 'trigger' the presentation of the clear resolution images versus the clear new images. Average looking times at both these image types will be compared, to measure levels of engagement and interest.

B50 Do infants attribute emotional valence to the interaction of geometric agents?

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Animacy perception, the cognitive bias by which observers attribute intentionality or emotion to inanimate objects, has been widely leveraged in developmental research. In this context, Premack (1990) proposed that infants could perceive self-propelled objects as intentional agents, while interpreting externally caused motion as causal. Building on this, Premack and Premack (1997) introduced animations featuring circles as agents engaged in social interactions—specifically Hit, Caress, Help, and Hinder—and found that infants could differentiate affiliative and hostile interactions. This framework has informed a growing body of research using geometric agents to study early social evaluation, showing that infants can distinguish and often prefer prosocial or non-aggressor agents (e.g., Geraci et al., 2022; Kanakogi et al., 2013; Hamlin et al., 2007). However, whether infants attribute emotional valence to specific types of abstract social interactions remains an open empirical question. The present study addresses this gap by examining whether preverbal infants match emotional vocal tones with geometric interactions depicting Hit and Caress scenarios. The animations, adapted from Premack and Premack (1997), will be presented in side-by-side pairs. Each pair will depict two geometric agents engaging in either affiliative (caressing) or aggressive (hitting) behavior toward a passive recipient agent. Following previous work (DeLoache & LoBue, 2009), a nonsense phrase will be delivered in either a happy or fearful tone—emotional prosody validated by Banse and Scherer (1996)—and played concurrently with the two animations. Here, infants' looking time for each animation will be recorded. We predict that gaze will align with emotional congruence: infants will look longer at caressing interactions when hearing a happy tone, and at hitting interactions when hearing a fearful tone. This would suggest that infants are not simply responding to perceptual cues, but integrating emotional prosody with the social meaning of the action. This study directly tests whether preverbal infants associate emotional vocal tones with abstract social interactions—clarifying whether they attribute emotional value to events like hitting and caressing, an assumption often made but rarely examined empirically. Findings consistent with our prediction would lend support to Premack and Premack's (1997) framework. At the time of presentation, we aim to share preliminary results and elaborate on the study's theoretical rationale and methodological refinements.

B51 Exploring infants' visual preferences in the context of natural versus urban landscapes

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Psychoevolutionary theories such as the biophilia theory (Wilson, 1984; Kellert & Wilson, 1995) propose that humans are innately attracted to nature because of our distinct phylogenetic history. The so-called savanna hypothesis even goes so far as postulating an evolutionary preference for savanna landscapes specifically (Orians, 1980; Balling & Falk, 1982). Adults' visual preferences for natural over urban landscapes has been consistently reported in empirical studies from multiple disciplines and across a range of methods (Kaplan & Kaplan, 1989; Barbiero & Berto, 2021; Schiebel et al., 2022). Though psychoevolutionary theories presuppose the innateness of humans' affinity for nature, surprisingly few studies have investigated preferences in early childhood or infancy. Contrary to the idea that humans instinctively prefer natural landscapes, initial evidence appears to suggest an early preference for urban scenes that gradually changes with age (Skelton et al., 2021; Meidenbauer et al., 2019). With the current project, we seek to explore 7-8-month-old infants' visual preferences for landscapes across two different experimental trials. We expect to recruit a total of 50-60 infants for this study. In the first trial, we will record infants' looking behavior (looking times, visual scanning) to simultaneous stimulus presentation of various urban and natural scenes. During the second trial, infants will be presented with a selection of natural scenes that belong to different landscape categories (e.g. park, forest, savanna). To be able to gauge the relative contribution of preferential looking behavior, we are considering including an additional control condition in which we present images that reliably attract infants' attention alongside less stimulating images. Contingent on compatibility with the design, looking behavior could be supplemented with psychophysiological data. Further, we aim to control for a selection of low-level visual features statistically and/or by design (i.e. matched pairs). Alongside eye tracking data, we plan on measuring environmental sensitivity through the Infant/Toddler Sensory Profile parent report (Dunn & Daniels, 2002) and the Test of Sensory Function (DeGangi & Greenspan, 1989). This will allow us to take a closer look at potential associations between early preferences and differences in perceptual sensitivity. Once implemented, the evidence from this exploratory work will provide insights into the proposed innateness of specific landscape preferences and contribute to our understanding of early brain-environment interactions.

B52 The effect of prenatal malnutrition on children's cognitive development and attainment: a systematic review

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Adequate nutrition is an essential part of both physical and psychological health. Malnutrition during childhood has been shown to be associated with impaired cognitive development and reduced academic success (Kirolos et al., 2022). However, the extent to which prenatal malnutrition may impact these psychological domains remains unclear. The current systematic review explores the extent to which various forms of malnutrition during pregnancy influence children's cognitive development, intelligence, and academic achievement. Following a pre-registered protocol (PROSPERO: CRD42024596445), five electronic databases were systematically searched for relevant literature (MEDLINE, PsycINFO, ERIC, Embase, and Scopus) up to October 2024. Studies were included if they assessed malnutrition during pregnancy, through either physiological biomarkers like blood serum, or self-report measures such as dietary intake questionnaires. Eligible studies also needed to report on child developmental outcomes, including attention, intelligence, cognitive development, or educational attainment. Studies were excluded if they assessed maternal nutritional status without explicitly classifying participants as malnourished through clinical criteria or predefined nutritional thresholds. Studies were also excluded if they focused on postnatal nutrition, utilised only non-behavioural outcomes (e.g., neuroimaging), or involved children with diagnosed neurodevelopmental disorders.