WILD 2022

5th Workshop on Infant Language Development

June 9th – June 11th, 2022

DONOSTIA-SAN SEBASTIAN

BASQUE COUNTRY, SPAIN

PROGRAM SUMMARY

THURSDAY, June 9th	FRIDAY, June 10th	SATURDAY, June 11th
08:00 - 08:50 Registration & Welcome Coffee **08:50 - 09:00** Opening Remarks **09:00 - 10:30** Keynote 1: **Catherine Tamis-LeMonda** **10:30 - 11:00** Coffee break **11:00 - 13:00** Oral Session 1 **13:00 - 15:00** Lunch break **15:00 - 16:40** Oral Session 2 **16:40 - 18:00** Poster Session 1 & Coffee break	**09:00 - 11:00** Oral Session 3 **11:00 - 11:30** Coffee break **11:30 - 13:00** Keynote 2: **Usha Goswami** **13:00 - 15:00** Lunch break **15:00 - 16:30** Oral Session 4 **16:30 - 18:00** Poster Session 2 & Coffee break …… **20:30 - 22:30** Conference Dinner* **KASKAZURI Restaurant**	**09:30 - 11:00** Keynote 3: **Kim Plunkett** **11:00 - 11:30** Coffee break **11:30 - 12:30** Oral Session 5 **12:30 - 12:40** Mini break **12:40 - 14:00** Oral Session 6 **14:00 - 14:15** Closing Remarks and award of the IBRO best student poster prize winner

* For Conference Dinner Registrees ONLY

WELCOME

Welcome to the fifth Workshop on Infant Language Development!

The first Workshop on Infant Language Development (WILD) took place in San Sebastian in 2013. It was followed by three outstanding meetings in Stockholm in 2015, Bilbao in 2017, and Potsdam in 2019. Last year, we made the difficult decision to postpone WILD until we could safely meet again in person. After the long wait, we are thrilled that WILD has returned to San Sebastian, and we are delighted to welcome you here!

WILD was created to provide a European forum where developmental researchers could gather to discuss the most recent advances in the fields of early language and cognitive development. To fulfill this goal, we have prepared a program with three exceptional keynote presentations and a selection of scientific talks and posters. Our program features research conducted using a variety of methodological approaches to investigate typical and atypical language development. It showcases our linguistic and cultural diversity, and it demonstrates our field's resilience in overcoming the challenges of the last two years.

Whether this is your first WILD or you are joining us again, we sincerely hope that you will enjoy our thought-provoking program and inspiring discussions. We also encourage you to take this opportunity to explore beautiful San Sebastian with its breathtaking scenery and world-renown cuisine.

WILD is organized by the Basque Center on Cognition, Brain and Language, with support from Sociedad Española de Psicología Experimental (SEPEX) and the International Brain Research Organization (IBRO). We are especially grateful to Leire Arietaleanizbeascoa and Oihana Vadillo for their invaluable assistance and to the many BCBLians who were involved in the conference organization.

We hope that you will enjoy WILD 2022!

Marina Kalashnikova and Manuel Carreiras, on behalf of the WILD Organizing Committee

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08:00 – 8:50 Registration & Welcome Coffee

08:50 – 9:00 Opening Remarks

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The Embodied Nature of Infant Language Learning

(Sponsored by IBRO Conference Sponsorships program)

10:30 – 11:00 Coffee Break

11:00 – 13:00 **Oral Session 1**

11:00-11:20 (OS. 1.1.) The effects of the speaker's eye gaze on infants' speech processing and word segmentation. *Melis Çetinçelik, Caroline F. Rowland & Tineke M. Snijders*

11:20-11:40 (OS. 1.2.) Lexicality is processed before phonological grammar in 19-month-olds. *Susana Silva, Cátia Severino, Marina Vigário & Sónia Frota*

11:40-12:00 (OS. 1.3.) Early electrophysiological markers in language and learning impairment: long-term follow-up from infancy to pre-school age and impact of early training. *Chiara Cantiani, Chiara Dondena, Massimo Molteni & Valentina Riva*

12:00-12:20 (OS. 1.4) Assessing language development across infancy: Early experimental measures and longitudinal brain-behaviour associations. *Sinead Rocha, Áine Ní Choisdealbha, Adam Attaheri, Natasha Mead, Helen Olawole-Scott, Christina Grey, Isabel Williams, Samuel Gibbon, Panagiotis Boutris, Perrine Brusini & Usha Goswami*

12:20-12:40 (OS. 1.5) The processing of gender features in toddlers: An ERP study. *Giulia Mornati, Perrine Brusini, Laura Cordolcini, Maria Teresa Guasti & Chiara Cantiani*

12:40-13:00 (OS. 1.6) The impact of temporally degraded speech on neural phonetic processing in infants and adults. *Monica Hegde & Laurianne Cabrera*

13:00 – 15:00 Lunch Break

15:00 – 16:40 Oral Session 2

15:00-15:20 (OS. 2.1.) Parent-child interaction, but not socioeconomic status influences language development in the first year of life. *Sarah der Nederlanden, Jeannette Schaeffer, Hedwig van Bakel & Evelien Dirks*

15:20-15:40 (OS. 2.2.) The interplay between parental input, children's interests and early word learning. *Rajalakshmi Madhavan & Nivedita Mani*

15:40-16:00 (OS. 2.3.) Discourse effects on the phonetic clarity of words in American English infant-directed speech. *Daniel Swingley*

16:00-16:20 (OS. 2.4)Parents' hyper-pitch and vowel category compactness in infant-directed speech are associated with 18-month-old toddlers' expressive vocabulary. *Audun Rosslund, Julien Mayor, Gabriella Óturai & Natalia Kartushina*

16:20-16:40 (OS. 2.5) Vowel hyperarticulation in Infant-Directed Speech: A Meta-Analysis. *Irena Lovcevic, Titia Benders, Christina Dideriksen, Sho Tsuji & Riccardo Fusaroli*

16:40 – 18:00 Poster Session I & Coffee Break

(IBRO STUDENT POSTER AWARD: Poster presentations with first authors who are graduate or undergraduate students will be considered for the Student Best Poster Award sponsored by the International Brain Research Organization (IBRO). The winner will be announced at the end of the conference and will receive a prize of 300€ and a certificate.)

CONFERENCE PROGRAM - FRIDAY, JUNE 10th

09:00 – 11:00 Oral session 3

09:00-09:20 (OS. 3.1.) Neural correlates of amplitude and formant rise time weighting in infants at- and not at-risk for dyslexia. *Antonia Goetz, Peter Varghese, Marina Kalashnikova, Denis Burnham & Usha Goswami*

09:20-09:40 (OS. 3.2.) Exploring effects of exposure to harmonic and non-harmonic languages on perceptual preferences in infants growing up in Ghana. *Paul Okyere Omane, Titia Benders & Natalie Boll-Avetisyan*

09:40-10:00 (OS. 3.3.) The consonant-bias is influenced by syllabic position in a familiar word recognition conflict task. *Leonardo Piot, Sandrien Van Ommen, Silvana Poltrock & Thierry Nazzi*

10:00-10:20 (OS. 3.4) Early word segmentation behind the mask. *Sónia Frota, Jovana Pejovic, Marisa Cruz, Cátia Severino & Marina Vigário*

10:20-10:40 (OS. 3.5) The impact of labels on working memory in 18- and 26-month-old toddlers. *Jelena Sucevic & Kim Plunkett*

10:40-11:00 (OS. 3.6) Vocabulary development in blind infants and toddlers: The influence of vision on early vocabulary. *Erin Campbell & Elika Bergelson*

11:00-11:30 Coffee Break

11:30 – 13:00 Keynote 2: Prof. Usha Goswami

Language Acquisition: A Temporal Sampling Perspective

13:00 – 15:00 Lunch Break

15:00 – 16:30 Oral Session 4:

15:00-15:20 (OS. 4.1.) Phonetic Features Excel Acoustics at 14 Months: Naturalistic Evidence from EEG Encoding Models across the First Five Years. *Katharina Menn, Claudia Männel & Meyer Lars*

15:20-15:40 (OS. 4.2.) Neural correlates of mutual exclusivity in bilingual and monolingual toddlers. *Maria Arredondo, Drew Weatherhead & Janet Werker*

15:40-16:00 (OS. 4.3.) Cortical tracking and phase amplitude coupling to sung speech in adults vs infants: A developmental comparison. *Adam Attaheri, Áine Ní Choisdealbha, Giovanni M. Di Liberto, Sinead Rocha, Perrine Brusini, Natasha Mead, Helen Olawole-Scott, Panagiotis Boutris, Samuel Gibbon, Isabel Williams, Christina Grey, Sheila Flanagan, Dimitris Panayiotou, Alessia Phillips & Usha Goswami*

16:00-16:20 (OS. 4.4) Infant neural entrainment to complex musical and speech stimuli: association with language acquisition and impact of early rhythmic training. *Chiara Cantiani, Chiara Dondena, Massimo Molteni, Valentina Riva & Caterina Piazza*

16:20-16:40 (OS. 4.5) The rhythm takes it all: A developmental approach to bilingual listeners' cortical tracking of speech after brief exposure to music. *Laura Fernández-Merino, Mikel Lizarazu, Nicola Molinaro & Marina Kalashnikova*

16:40 – 18:00 Poster Session II & Coffe Break

(IBRO STUDENT POSTER AWARD: Poster presentations with first authors who are graduate or undergraduate students will be considered for the Student Best Poster Award sponsored by the International Brain Research Organization (IBRO). The winner will be announced at the end of the conference and will receive a prize of 300€ and a certificate.)

CONFERENCE PROGRAM - SATURDAY, JUNE 11th

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How Infants Build a Semantic System

11:00-11:30 Coffee Break

11:30-12:30 Oral session 5

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11:50-12:10 (OS. 5.2.) Children's exposure to language switching in bilingual homes across two communities. *Jessica Kosie, Rachel Tsui, Taylor Martinez, Andrea Sander, Laia Fibla, Christine Potter, Krista Byers-Heinlein & Casey Lew-Williams*

12:10-12:30 (OS. 5.3.) Infant Exposure to Speech in Multicultural Environments. *Anna Caunt & Rana Abu-Zhaya*

12:30 – 12:40 Break

12:40-14:20 Oral session 6

12:40-13:00 (OS. 6.1.) Consistency and reporting in preprocessing and analysis of infant ERP data - a systematic review. *Mariella Paul & Nivedita Mani*

13:00-13:20 (OS. 6.2.) The (null) effect of socio-economic status on the language and gestures of young infants: Evidence from British English and eight other languages. *Caroline Rowland, Katherine Alcock & Kerstin Meints*

13:20-13:40 (OS. 6.3.) COVID-19 first lockdown as a window into language acquisition: associations between caregiver-child activities and vocabulary gains. *Natalia Kartushina, Nivedita Mani, Christina Bergmann & Julien Mayor*

13:40-14:00 (OS. 6.4) Vocabulary size lag in UK bilingual toddlers relative to monolinguals in both comprehension and production. *Serene Siow, Nicola Gillen, Irina Lepadatu & Kim Plunkett*

14:00-14:15 Closing remarks and award of the IBRO best student poster prize winner

CONFERENCE PROGRAM - POSTER SESSION I

PS. 1. 1. Caregivers' Language Attitudes and Code-Switching Habits in Multilingual Environments. *Anna Caunt & Rana Abu-Zhaya*

PS. 1. 2. Caregivers differ in verbal and nonverbal responsiveness during early play. *Anika van der Klis, René Kager & Frans Adriaans*

PS. 1. 3. Infant-Directed Communication: Examining the multimodal dynamics of infants' everyday interactions with caregivers. *Jessica Kosie & Casey Lew-Williams*

PS. 1. 4. Infant-directed speech supports phonotactic learning in German. *Rowena Garcia & Natalie Boll-Avetisyan*

PS. 1. 5. Infants' social preference for artificially sounding native speakers and robot agents*. Anne Bauch, Shoji Itakura & Claudia Friedrich*

PS. 1. 6. Parents' cell phone usage and young children's language development. *Delphine Nguyen, Yaniv Hanoch & Caroline Floccia*

PS. 1. 7. Size Sound Symbolism in Mothers' Speech to their Infants. *Tamar Keren-Portnoy, Ghada Khattab, Catherine Laing, Shayne Sloggett, Margherita Belia, Christopher Cox, Ali Langner, Rory DePaolis & Marilyn Vihman*

PS. 1. 8. The role of caregiver feedback on early vocalisations: Investigating infants' phonological development following cochlear implantation. *Alice Langner*

PS. 1. 9. The role of mother-infant emotional synchrony in speech processing in 9-month-old infants. *Monica Vanoncini, Natalie Boll-Avetisyan, Birgit Elsner, Stefanie Hoehl & Ezgi Kayhan*

PS. 1. 10. A Baby Test Toy as a new method for testing infants' auditory preferences. *Natalie Boll-Avetisyan, Mireia Marimon, Alan Langus & Anna-Sophia Guhl*

PS. 1. 11. A resource of word associations in 3-year-olds which are not captured by adult associative norms. *Nadine Fitzpatrick & Caroline Floccia*

PS. 1. 12. Alignments between direct tablet-based assessment of word comprehension and parental reports depend on the child's age and word types. *Audun Rosslund, Ida Roepstorff, Chang Huan Lo, Jun Ho Chai, Julien Mayor & Natalia Kartushina*

PS. 1. 13. Development of a touchscreen based language measure for French toddlers. *Cecile Crimon, Sho Tsuji, Anne Christophe, Anne-Caroline Fiévet & Alejandrina Cristia*

PS. 1. 14. Exploring a novel method for plotting families' activities during a daylong recording of children's naturalistic language input. *Caitlin Holme, Patricia Lucas, Sam Harding, Sue Roulstone & Yvonne Wren*

PS. 1. 15. Lookit Plus: Infancy Research in the Time of Covid - and Beyond. *Eylem Altuntas, Chris Wang, Clarissa Montino, Johnson Chen, Catherine Best & Denis Burnham*

PS. 1. 16. ManyBabies-AtHome Looking While Listening: Constructing an online, cross-linguistic investigation of word recognition. *Katie Von Holzen*

PS. 1. 17. Measuring interest in early childhood - a validation of various interest measures of young children. *Rajalakshmi Madhavan, Ben Malem, Lena Ackermann & Nivedita Mani*

PS. 1. 18. Not the same category? Online and laboratory-based infant looking time data. *Ricarda Bothe & Nivedita Mani*

PS. 1. 19. Phase-locking of non-nutritive sucking to language stimuli: Understanding infants' synchronization to speech. *Guro S. Sjuls, Valentin Vulchanov & Mila D. Vulchanova*

PS. 1. 20. Relationships between different measures of language development in Czech children. *Klára Matiasovitsová, Jakub Sláma, Petra Čechová, Jolana Kohoutková, Kamila Homolková & Filip Smolík*

PS. 1. 21. A pre-registered systematic review of methods used for detecting MMNs for categorical perception of sounds, with particular attention to speech sounds in infant. *Han Ke, Vanja Kovic, Anđela Šoškić, Nur Sakinah Mohd Salleh, Shaza binte Amran & Suzy J Styles*

PS. 1. 22. Acoustic sensitivity to vowels and fricatives during the first year of life and its relationship with later lexical development. *Kathleen McCarthy, Katrin Skoruppa & Paul Iverson*

PS. 1. 23. Acquisition of novel lexical items: an event-related potential study in French-learning 2-year-olds. *Pia Rämä & Oytun Aygün*

PS. 1. 24. Amplitude modulation following response in 3-month-old infants: is there a link with the ability to perceive speech in noise?. *Laurianne Cabrera, Marielle Hababoub-Bernson & Irene Lorenzini*

PS. 1. 25. An electrophysiological study on stress discrimination by European Portuguese-learning infants. *Shuang Lu, Cátia Severino, Marina Vigário & Sónia Frota*

PS. 1. 26. Artificial language segmentation in 6-to-7 month-old German-learning infants. *Mireia Marimon & Barbara Höhle*

PS. 1. 27. Brain Myelination at 7 Months of Age Predicts Language Production During Early Childhood. *Neva Corrigan, Vasily Yarnykh, T. Christina Zhao, Elizabeth Huber & Patricia Kuhl*

PS. 1. 28. Brain Myelin Density at 7 Months of Age Predicts Neural Sensitivity to Speech Contrasts at 11 Months of Age. *Neva Corrigan, T. Christina Zhao, Vasily Yarnykh & Patricia Kuhl*

PS. 1. 29. Cortical tracking of auditory rhythm across the first year: An EEG study. *Áine Ní Choisdealbha, Adam Attaheri, Sinead Rocha, Perrine Brusini, Natasha Mead, Helen Olawole-Scott, Christina Grey, Declan Hines, Samuel Gibbon, Panagiotis Boutris, Sheila A. Flanagan & Usha Goswami*

PS. 1. 30. Disentangling the factors that influence polarity in infant MMR - A critical review. *Martina Dvořáková, Gisela H. Govaart, Kateřina Chládková & Claudia Männel*

PS. 1. 31. Infants show enhanced neural response to musical meter frequencies. *Tomas Lenc, Varghese Peter, Caitlin Hooper, Peter Keller, Denis Burnham & Sylvie Nozaradan*

PS. 1. 32. Nonadjacent dependency learning in French-learning 27-month-old toddlers. *Julie Bodard, Thierry Nazzi & Katrin Skoruppa*

PS. 1. 33. Representing prosodic cues in the 6-month- old infants' brain. *Ege Ekin Özer, Konstantina Zacharaki, Silvana Silva-Pereira, Marcela Peña & Nuria Sebastian-Galles*

PS. 1. 34. Why do young children undress oranges? The neural signatures of unconventional verb extensions. *Lucas Raynal, Evelyne Clément, Pia Rämä, Emmanuel Sander & Louise Goyet*

PS. 1. 35. Caregiver responsivity, acceptance, and school readiness cognitive components in a Uruguayan sample. *Clementina Tomás-Llerena, Enrique Arranz-Freijo & Alejandro Vásquez-Echeverría*

PS. 1. 36. Sustained Pacifier Use is Associated with Smaller Vocabulary Sizes at 1 and 2 Years of Age. *Luis Munoz, Natalia Kartushina & Julien Mayor*

PS. 1. 37. Verb learning in Japanese and English: Do Comparisons Help?. *Jane Childers, Akari Notsu, Marissa Young, Victoria Bell & Mutsumi Imai*

PS. 1. 38. Relating referential clarity and auditory clarity in infant-directed speech. *Caroline Beech & Daniel Swingley*

PS. 1. 39. The role of talker identity on semantic representations of newly learned words. *Drew Weatherhead, Erica Wojcik & Emma Tupper*

PS. 1. 40. Cortical Tracking of Infant- and Adult-Directed Speech in the First Year of Life. *Lena Mehlem, Laura Fernandez Merino, Nicola Molinaro & Marina Kalashnikova*

CONFERENCE PROGRAM - POSTER SESSION II

PS. 2. 1. Are vocabulary outcomes in children with cochlear implants affected by music exposure and maternal musicality?. *Valentina Persici, Michela Santangelo, Letizia Guerzoni, Domenico Cuda, Reyna L. Gordon & Marinella Majorano*

PS. 2. 2. Cognitive predictors of language abilities in primary school children: A cascaded developmental view. *Joana Acha, Ainhize Agirregoikoa, Florencia B. Barreto & Enrique Arranz*

PS. 2. 3. Infants Born At Risk vs Not At Risk for Dyslexia: Effects on Later Auditory-Visual Processing. *Marina Kalashnikova, Usha Goswami & Denis Burnham*

PS. 2. 4. Infants' neural speech discrimination predicts individual differences in grammar ability at 6 years of age and their risk of developing speech-language disorders. *Tian Zhao, Olivia Boorom, Patricia Kuhl & Reyna Gordon*

PS. 2. 5. Neural processing of speech is related to cognitive skills in infants. *Tian Zhao & Patricia Kuhl*

PS. 2. 6. Seeing is hearing: Neural and behavioural adaptations in children with hearing loss before cochlear implantation. *Irene Arrieta, Zuriñe Martinez, Manuel Carreiras, Xabier Altuna, Borja Blanco, Cesar Caballero & Marina Kalashnikova*

PS. 2. 7. Selective attention to the mouth of signing faces. *Konstantina Zacharaki, Gonzalo Garcia-Castro & Nuria Sebastian-Galles*

PS. 2. 8. The influence of dyslexia risk status on child language timing measures. *Carmel Brough, Áine Ní Choisdealbha, Sinead Rocha, Adam Attaheri, Helen Olawole-Scott, Christina Grey, Natasha Mead, Maria Alfaro e Oliveira, Isabel Williams, Samuel Gibbon & Usha Goswami*

PS. 2. 9. Conversational turn-prediction abilities in bilingual toddlers. *Irene Alonso & Marina Kalashnikova*

PS. 2 10. Early language processing skills in monolingual and bilingual infants. *Letizia Volpin, Salomé Schwob& Katrin Skoruppa*

PS. 2. 11. Exploring differences between monolingual and multilingual infants on the CDI and ASQ. *Maria Alfaro e Oliveira, Sinead Rocha, Adam Attaheri, Áine Ní Choisdealbha, Natasha Mead, Helen Olawole-Scott, Samuel Gibbon, Panagiotis Boutris, Isabel Williams, Christina Grey, Perrine Brusini, Carmel Brough & Usha Goswami*

PS. 2. 12. How dialectal variability affects early word form recognition - Testing mono- and bi-varietal children via an App. *Lotta Kiefe, Katharina Zahner-Ritter & Bettina Braun*

PS. 2. 13. Impact of bilingual books on the use of extra-textual talk during bookreading interactions in bilingual parent-child dyads. *Alejandra Reinoso, Maria Mendoza, Charlotte Herbolsheimer & Adriana Weisleder*

PS. 2. 14. Lexical-semantic activation in dominant and non-dominant languages of French-Spanish and French-English bilingual toddlers: an ERP investigation. *Pia Rämä, Cydney Chiball & Yumisay Rukoz*

PS. 2. 15. The emergence of inhibitory links in the developing lexicon: insights from bilingual participants. *Gonzalo Garcia-Castro, Serene Siow, Irina Lepadatu, Nicola A Guillen, Daniela S Avila-Varela, Núria Sebastian-Galles & Kim Plunkett*

PS. 2. 16. How to build a CDI: insights from adaptations to 40 different languages. *Lucie Jarůšková, Nikola Paillereau, Filip Smolík & Kateřina Chládková*

PS. 2. 17. Language measures in the YOUth cohort: Validating the modified N-CDIs and PPVT-III-NL. *Anika van der Klis & Caroline Junge*

PS. 2. 18. Coping with dialects from birth: Role of variability on infants' early language development. Insights from Norwegian dialects. *Natalia Kartushina & Julien Mayor*

PS. 2. 19. Early predictors of language outcomes: Prosody and gestures. *Ricardo Sousa, Susana Silva & Sónia Frota*

PS. 2. 20. Infants use word-level stress for word recognition. *Ulrike Schild, Jessica Steil & Claudia Friedrich*

PS. 2. 21. Is tactile rhythm perception related to early language skills? an explorative study. *Sofia Russo, Giulia Calignano, Filippo Carnovalini, Barbara Arfé, Antonio Rodà, Paola Curcuruto & Eloisa Valenza*

PS. 2. 22. Language-mediated selective attention in 18- and 26-month-old toddlers. *Jelena Sucevic & Kim Plunkett*

PS. 2. 23. Mask wearing in Japanese and French nursery schools: The perceived impact of masks on communication. *Monica Barbir, Cecile Crimon, Hiromichi Hagihara, Emma de Araujo, Sachiko Nozawa, Yuta Shinya, Nawal Abboub & Sho Tsuji*

PS. 2. 24. Phonological Abstraction in Early Infancy: An Amodal Speech Perception Study. *Eylem Altuntas, Catherine Best, Marina Kalashnikova, Antonia Goetz & Denis Burnham*

PS. 2. 25. Six-month olds detect a novel speech sound contrast more effectively from unfamiliar rhythm. *Kateřina Chládková, Václav Jonáš Podlipský, Nikola Paillereau, Natalia Nudga & Šárka Šimáčková*

PS. 2. 26. The impact of spectrally degraded speech on the word segmentation abilities on infants with normal hearing. *Monica Hegde, Irene de la Cruz-Pavía, Thierry Nazzi & Laurianne Cabrera*

PS. 2. 27. The Interrelatedness of Speech and Face Discrimination Beyond Perceptual Attunement. *Fleur Vissers, Antonia Götz, Gudrun Schwarzer & Barbara Höhle*

PS. 2. 28. Memory-card phonetic training of English vowels for bilingual children. *Begoña Pericas Herrero & Paul Iverson*

PS. 2. 29. Active learning and feedback in word learning. *Martina de Eccher & Nivedita Mani*

PS. 2. 30. Do German-learning infants rely on word frequency differences within the looking-while-listening task?. *Jessica N. Steil, Ulrike Schild & Claudia K. Friedrich*

PS. 2. 31. Do toddlers implicitly name familiar objects?: Considering the effects of age and preview time. *Nicola Gillen & Kim Plunkett*

PS. 2. 32. Exploring systematicity in the developing lexicon with phonological networks. *Catherine Laing*

PS. 2. 33. On the Dimensional Structure of Vocabulary and Grammar in Early Language Development. *Seamus Donnelly, Evan Kidd, Jay Verkuilen & Caroline Rowland*

PS. 2. 34. Season-of-birth effects on infant vocabulary size. *Luis Munoz, Natalia Kartushina & Julien Mayor*

PS. 2. 35. Sensorimotor maturation impacts early lexical processing: initial evidence. *Irene Lorenzini, Anthony Picaud & Thierry Nazzi*

PS. 2. 36. Supporting referent selection through word form-meaning systematicity. *Ming Yean Sia, Emily Mather, Matthew Crocker & Nivedita Mani*

PS. 2. 37. The role of word properties in early word learning: A study with Polish Communicative Development Inventories. *Magdalena Krysztofiak, Grzegorz Krajewski, Magdalena Łuniewska, Karolina Mieszkowska & Ewa Haman*

PS. 2. 38. The semantic interference in 9- to 36- month-olds: An at-home eye-tracking study on infants lexical abilities. *Giulia Calignano, Alessandra Micelli, Sofia Russo, Elisa Di Giorgio, Silvia Elena Benavides Varela, Natalia Reoyo Serrano & Eloisa Valenza*

PS. 2. 39. Using eye tracking to better understand children's processing of events during verb learning: Is the focus on people (faces) or their actions (hands)?. *Jane Childers, Blaire Porter, Marissa Young, Sneh Lalani & Akila Gopalkrishnan*

PS. 2. 40. Vocabulary composition in early lexical development of Croatian speaking two-year-old children*. Antonija Blaži Ostojić & Jelena Kuvač Kraljević*

PS. 2. 41. Language resources, language choices, and translanguaging in parent/child interactions in Singapore. *Suzy J Styles, Fei Ting Woon, Victoria Chua, Serafina Fong, Jinyi Wong & Tuan Anh Le*

ABSTRACTS

[K-1] IBRO Sponsored Speaker

The Embodied Nature of Infant Language Learning

Catherine S. Tamis-LeMonda [1]

[1] New York University

Learning is an embodied process. Infants actively navigate a world filled with cultural artifacts and social partners. And as they do, they generate rich opportunities for learning. In this talk, I sample from multiple studies (infants 1 to 2 years) to show how infants' moment-to moment interactions with the objects, places, and spaces of the home environment feed into language learning. Specifically, environmental materials, spaces, and routine activities provide a backdrop for infants to discover and play; in turn, infant actions elicit multimodal input from caregivers; and social input in the context of infant play reduces referential ambiguity to facilitate word learning. Findings across studies collectively illustrate key principles of cascading developmental processes that guide our work: (1) Environments are rich with opportunities for infants to discover and explore, (2) Children exploit environmental opportunities by actively engaging with whatever objects, spaces, and people are available to them; (3) Language learning is socially embedded, with infant behaviors eliciting contingently responsive inputs from caregivers; and (4) Learning and development unfold in real time as behaviors in one domain cascade to behaviors in another.

[K-2]

Language Acquisition: A Temporal Sampling Perspective

Usha Goswami [1]

[1] University of Cambridge

Recent insights from auditory neuroscience provide a new perspective on how the brain encodes speech. Using these recent insights, I will provide an overview of key factors underpinning individual differences in children's development of language and phonology, starting out from the context of our child studies exploring atypical phonological development (dyslexia). I will describe a neural oscillatory "temporal sampling" framework for linking amplitude rise time discrimination to linguistic development by children. I will show that sensitivity to the amplitude modulation (AM) structure of the amplitude envelope of infant-directed and child-directed speech is key to individual differences in phonological development, and that this AM structure contains acoustic statistical cues to different phonological units. I will then discuss how we have been applying Temporal Sampling theory to language acquisition by giving a selective overview of findings from our infant longitudinal studies, SEEDS and BabyRhythm. I will aim to show that amplitude rise time discrimination and neural oscillatory temporal sampling play key roles in early language development.

Goswami, U. (2019). Speech rhythm and language acquisition: An amplitude modulation phase hierarchy perspective. Annals of the New York Academy of Sciences, e14137. Kalashnikova, M., Goswami, U., Burnham, D. (2020). Novel word learning deficits in infants at family risk for dyslexia. Dyslexia, e1649. Attaheri, A. et al. (2022). Delta- and theta-band cortical tracking and phase-amplitude coupling to sung speech by infants. Neuroimage, 247, 198648. Ní Choisdealbha, A., et al. (2022a). Neural detection of changes in amplitude rise time in infancy. Developmental Cognitive Neuroscience, 54, 101075. Ní Choisdealbha, A., et al. (2022b), Cortical Oscillations in Pre-verbal Infants Track Rhythmic Speech and Non-speech Stimuli. https://psyarxiv.com/vjmf6/

[K-3]

How Infants Build a Semantic System

Kim Plunkett [1]

[1] University of Oxford

Studies of early semantic development have traditionally described changes in the referential scope of early words, e.g., the range of objects that the infant associates with the word 'dog', as if infants learn object-label associations in isolation from each other. A proper understanding of semantic development should also provide an account of sensitivity to the meaning relations in the developing lexicon, and elaborate the principles and processes by which the toddler constructs a network of meanings. In this talk, I will describe some recent experimental studies to investigate the early development of the lexical-semantic system, some graph-theoretic attempts to describe semantic networks in early childhood and computational models of the infant lexical-semantic system. I will argue that the rudiments of a lexical-semantic system are in place before the child's second birthday. I will discuss whether infants attempt to construct a semantic network from the beginning of lexical development, or whether the early semantic system consists of lexical islands to which entries are added in a piecemeal fashion, only later to coalesce into a network of meanings.

[OS-1.1]

The effects of the speaker's eye gaze on infants' speech processing and word segmentation

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Eye gaze is a powerful ostensive social cue that facilitates children's learning in various domains of cognitive development, including language. While the language development literature mainly suggests links between gaze following and later vocabulary, the effects of eye gaze on other aspects of language development, such as word segmentation and speech processing, are less clear (Çetinçelik et al., 2021). In the current study, we investigated infants' cortical tracking of continuous speech (as measured by speech-brain coherence [SBC]) and word segmentation (as measured by the ERP familiarity effect) in ostensive and non-ostensive conditions. 10-month-old infants watched videos of an adult Dutch speaker telling stories, addressing the infant either with direct or averted eye gaze while speaking. The audio-visual stories consisted of four sentences, with one word repeated in every sentence for each story. Each video was followed by audio-only isolated words (familiar/novel). 32-channel EEG was recorded throughout the experiment. First, we tested infants' (N = 30) ERP familiarity effect for the single words in the 250-500 ms and 600-800 ms time-windows. Our results revealed a significant interaction effect between time and familiarity of the test words ($F(1, 29)=4.98$, $p=0.034$). This effect was driven by the familiarity effect in the late time window (600-800 ms), with infants displaying a more negative ERP response to familiar (MavgERP =2.1, SD = 6.47) compared to novel words (M =4.74, SD =6.38), $t(29)= -2.38$, $p= 0.027$. We found no significant effect of speaker's eye gaze on infants' word segmentation abilities. Overall, our results suggest that 10-month-old infants can pick up repetition in speech regardless of the ostensiveness of the speech. Additionally, we assessed whether the speaker's eye gaze direction (direct vs. averted) facilitated speech processing, as measured by SBC at the syllable and stressed syllable rates. Preliminary SBC findings will be presented at the conference.

[OS-1.2]

Lexicality is processed before phonological grammar in 19-month-olds

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The time course of the processing of sound sequences and their integration with lexical meaning was investigated in a previous EEG study with adults. While looking at pictures of familiar objects, subjects listened to illegal sound sequences, legal sound combinations (pseudowords) with either high or low frequency, and actual words that were either congruent or incongruent to a picture context. We found evidence that phonological grammar (pseudowords vs. illegal words, signalled by the N1-P2 complex), phonotactic frequency (high-frequency vs. low-frequency pseudowords, signalled by a P3-like component) and lexicality (words vs. pseudowords/illegal sequences, signalled by a N400 and N800) follow one another in this order during word processing. Little is known about the interplay between phonological grammar, phonotactic frequency and lexicality in the development of word processing. Using the same picture-word priming paradigm and stimuli from the adult study, which were designed to be suited to toddlers, we examined the brain responses of 19-month-olds (N=23). Results showed that lexicality is marked by increased positivity for pseudowords compared to words, at the 380-450 ms time-window (a P3-like component) and between 590 and 650 ms (a P600-like component). A late effect of phonological grammar was found through the detection of illegal sequences as different from pseudowords, which was signalled by an increased positivity for pseudowords compared to illegal sequences at the 810-910 ms time-window. Contrasts in phonotactic frequency did not elicit significant differences in EEG responses (Fig.1). These results differ from the adult findings in two important ways: (i) phonological grammar seems to be processed later then lexicality; (ii) phonotactic frequency seems not yet to affect the processing of sound sequences. Our findings thus suggest that, unlike adults, toddlers are driven to process lexicality, that is sound-meaning relations, over the phonological properties of sound sequences, which seem to be postponed to later stages.

[OS-1.3]

Early electrophysiological markers in language and learning impairment: long-term follow-up from infancy to pre-school age and impact of early training

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Rapid Auditory Processing skills (RAP) are critical for speech processing, linguistic development and reading acquisition. Infants with family history for language and learning impairment (LLI), including both language disorders and reading disabilities, have often been found impaired in RAP skills, as reflected in electrophysiological anomalies concerning the amplitude and latency of the obligatory components (e.g., P1, N2) and of the MisMatch Response.

Here, we report the findings of a large Italian longitudinal study. 90 typically developing infants and 50 infants at familiar risk for LLI (defined as having a first-grade relative affected) have been tested at 6 and/or 12 months of age by means of an auditory multi-feature oddball paradigm including non-speech stimuli presented in rapid succession (Cantiani et al. 2016). As part of the longitudinal study, infants underwent a linguistic assessment at 20, 24, 36 months of age, and a broad neuropsychological assessment (including pre-reading skills) at 4,5 and 5,5 years of age. A subgroup of typically developing infants (n=15) participated between 7 and 9 months of age to an early rhythmic training providing exposure to and active synchronization with complex musical rhythms (Dondena et al., 2021). The main findings of the study include (1) the definition of the typical developmental trajectories of the electrophysiological patterns underlying RAP between 6 and 12 months of age; (2) the comparison of such typical patterns with those of infants at familiar risk for LLI; (3) the associations between these early electrophysiological patterns and later language and neuropsychological skills; (4) the preliminary assessment of the impact of the early rhythmic training on the typical electrophysiological patterns and on early language skills. The present results may have theoretical benefits in better understanding typical and atypical developmental trajectories of language acquisition and clinical implications in the development of more effective and specific interventions.

[OS-1.4]

Assessing language development across infancy: Early experimental measures and longitudinal brain-behaviour associations

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The Cambridge UK BabyRhythm Project is a study of 122 infants as they age from 2 – 30 months, investigating neural entrainment and sensorimotor synchronisation to acoustic and visual rhythm in relation to language acquisition. Participating infants attended for 8 brain imaging (EEG) and motion capture sessions between the ages of 2 – 11 months, and received language tasks beginning at 8 months. Here we present the standardised and experimental tasks selected to sample 5 linguistic domains: semantics, phonology, grammar, rhythmic timing, and gesture. Although originally designed to be administered in-person, we were able to translate many of our tasks to be administered online, providing a unique set of tools for assessing infants remotely. We describe improvements in infant performance across measures over age, and show strong relations between measures within each linguistic domain. Bayesian analyses provide evidence for similar performance between monolingual (N = 92) and multilingual (N = 30) learners, and similar performance between sexes, except superior speech timing for female infants (BF10 = 60.139). A principle aim of the BabyRhythm project is to relate individual differences in early neural entrainment and motor rhythm production to later language outcomes. Here we select the most robust language tasks for longitudinal brain-behaviour analyses, choosing those which show a good range and distribution of results, have data available for the majority of our sample, and show positive associations with other measures. Three experimental measures meet our criteria, indexing gesture (pointing at 12-months), semantics (receptive vocabulary at 18-months) and phonology (nonword repetition at 24-months). Finally, we present multivariate multiple regressions modelling longitudinal brain-behaviour relationships using these outcome variables and our rich dataset of repeated EEG and motion capture measures of early rhythm perception and production.

[OS-1.5]

The processing of gender features in toddlers: An ERP study

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Italian nouns are preceded by articles, which changes according to the noun gender and number. Nouns feature either a biological, transparent relationship between the referent's biological sex and the noun gender (as ladetfem bambinchild-afem for the little girl) or a formal gender, where the gender is assigned arbitrarily (ladetfem sediafem the chair). Previous studies on adults have shown that typical ERP components are elicited by a gender violation: a posterior positivity (P600) sometimes preceded by a negativity (LAN/N400). However, little is known about how and when toddlers process gender. Here, we investigated biological and formal gender processing by Italian adults and two groups of toddlers (14 and 24 months). We tested our participants using an auditory-visual violation task. In each trial, one picture was presented on a screen, associated with an auditory stimulus ("Look at themasc/fem big [nounmasc/fem]"). This stimulus could correctly describe the image (Match condition), or not, creating a gender violation with the image (MisMatch condition). Additionally, the nouns were divided based on the type of gender (Bio vs Formal). Analyses were conducted using a cluster-based permutation and showed that adults detect the gender mismatch showing an anterior negativity triggered in the article time window and a posterior positivity during the noun processing. In both toddler groups, the detection of the gender mismatch was characterised only by a positivity: in 24-month-old toddlers, it emerged already during the processing of the article, while in 14-month-old infants, the effect aligned with the noun processing. Opposite patterns emerged investigating the types of gender: adults relied more on formal gender while 24-month-olds on biological gender. In sum, these results indicate that processing of gender mismatch in noun phrases is already in place at 14 and 24-month of age, but only 24-month-olds detect it on the basis of the article (as do adults).

[OS-1.6]

The impact of temporally degraded speech on neural phonetic processing in infants and adults

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Before 10 months of age, infants are not yet attuned to the consonants of their native language, meaning that, compared to adults, they are sensitive to certain non-native phonological contrasts. The nature of the mechanisms shaped by age and exposure to the native language is yet to be discovered. The current project hypothesizes that auditory mechanisms supporting speech perception may play a crucial role in perceptual attunement. The project explores the interaction between auditory and speech perception abilities during early development by looking at the neural correlates underlying the processing of specific speech acoustic cues.

This study adopts a psychoacoustic approach suggesting that the auditory system selectively decomposes the spectral and temporal modulations of speech. Such acoustic modulations can be artificially manipulated using vocoders to assess their role in speech perception. To explore the neural underpinnings of the processing of temporal modulations, and particularly of amplitude and frequency modulations (AM/FM), we used electroencephalography (EEG) to measure the cortical auditory evoked potentials (CAEPs) for native and non-native consonants in French-learning 6-month-old (N=21), 10-month-old (N=20) and French adult listeners (N=21). We used vocoders to process three syllables: French-voiced /aba/, French-unvoiced-unaspirated /apa/, and an English-unvoiced-aspirated /apha/. Three vocoder conditions were designed to preserve: i) original FM and AM, ii) original AM only, and iii) the slowest AM (< 8 Hz) only. Overall, our results show that all groups show different CAEPs between the original sounds and their FM degraded versions, but that further degradation of faster AM cues did not further affect CAEPs. When looking at individual syllables, 10-month-old response patterns are more aligned with adult's, suggesting that neural processing of temporal modulations may already be adult-like at 10-months of age.

[OS-2.1]

Parent-child interaction, but not socioeconomic status influences language development in the first year of life

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While the effect of socioeconomic status (SES) on language development is well-recognized, there is little research on SES-effects on language in children before age one. Furthermore, evidence of SES-effects on specific language abilities is mixed (McGillion et al., 2017; Vasilyeva et al., 2008 a.o.). We investigated a) when the first SES-effects on language are observed, b) whether SES affects structural language abilities (e.g. phonology, morphology, syntax) differently from non-structural abilities (e.g. lexical and metalinguistic knowledge) and c) the effects of three variables previously argued to be linked to SES – gestational duration, stressful life events and parent-child interaction – on language development in the first year of life.

Parents of 540 Dutch-acquiring infants aged 8-13 months responded to an extensive questionnaire. Highest finished level of education and subjective financial stability were used as measures of SES. Language development was measured using the LENA Developmental Snapshot (Gilkerson et al., 2017), a parental questionnaire including questions about structural and non-structural language abilities. Parent-Child Interaction was measured by the Brigance Parent-Child Interaction Scale (Glascoe & Brigance, 2002). Our results provide no evidence for SES-effects on (structural or non-structural) language development during the first year of life. Although gestational duration initially emerges as a significant predictor of language scores, it does not when corrected for gestational age. Furthermore, there is no correlation between three stressful life events (divorce, disease and job-loss) and language scores. However, Parent-Child Interaction does significantly predict language scores. Although previous research has linked Parent-Child Interaction and SES (Hart & Risley, 1995; Vanormelingen & Gillis, 2016), this link is not found in the current study. Interestingly, while previous studies report that Parent-Child Interaction influences language development (Hoff, 2003; Weisleder & Fernald, 2013, a.o.), the current study shows that this effect can already be observed within the first year of life.

[OS-2.2]

The interplay between parental input, children's interests and early word learning

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Parental language input is vital for children's vocabulary growth and every-day activities like shared book-reading boost language acquisition (Mol, Bus, deJong, & Smeets, 2008). Research also suggests that children actively influence their learning, eliciting information they are interested in and retaining such information better (Mani & Ackermann, 2018). To what extent does children's active interest in particular topics modulate the quality of caregiver-child interaction when engaging in such topics? This study examines (1) whether parents accurately pinpoint their child's interests; (2) whether the quality of caregiver-child interaction (QOI) during shared book-reading is modulated by children's interest in the content being discussed (3) the combined effect of the quality of caregiver-child interaction and children's interests on children's learning. This study has three parts: (a) Shared book-reading task where parents read two books to their child – one determined to be of low and one of high interest to the child (with one novel word-object mapping introduced in each book), (b) eye-tracking task examining children's looking time to objects of different categories as index of children's interest in the categories and (c) eye-tracking task testing recognition of newly-introduced word-object mappings. Preliminary analyses show that (1) only 26% of parents indicated a category to be of high interest to their child which was also the category that children showed longest looking times to. However, 71% of parents correctly indicated a category to be of high interest to a child, that children showed greater than median looking times to, (2) QOI is significantly associated with the child's previously noted interest in the book being read, with high-interest books scoring higher on QOI compared to low-interest books. Taken together, this study examines how parents respond to children's interests in a semi-naturalistic setting, and how such responsiveness and these interests combine to boost language learning.

[OS-2.3]

Discourse effects on the phonetic clarity of words in American English infant-directed speech

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Infants begin learning their language's phonological system and its words at the same time, and face the difficult problem of identifying when a given phonetic sequence counts as an instance of a familiar word. To do this, young infants with still-inchoate lexicons must compare incoming speech with some representation of previously heard speech, a computationally expensive problem (Jansen & Van Durme, 2011). Plausibly, infants might therefore learn best the words that are repeated in successive utterances (Schwab & Lew-Williams, 2016). If so, understanding the onset of (proto)lexical development depends partly on characterizing the phonetic nature of repeated words in infant-directed speech. Here, we pulled from the Brent corpus a sample of open-class words that were repeated in consecutive utterances and present on the CDI. We hypothesized that first mentions would be more intelligible than second mentions (e.g. Fisher & Tokura, 1995). Listeners performed three tasks over 172 word pairs: rating each word's clarity, transcribing each word token, and choosing which token of a pair was the clearer, yielding a dataset of ~15,500 judgments. Randomization ensured listeners' ignorance of true first-mention vs. second-mention status.

The three tasks yielded similar results. First-mentioned words were clearer, in all three tasks. These effects were significant, though small. First-mentioned words were correctly transcribed on 69% of trials, against 66% for second-mentions. Over word-types, the mean proportion of first-mention forced-choices was 58% (min. mother, 53%, max., 62%). Narrow majorities among listeners suggest that the difference in each pair was usually subtle. Words were most often utterance-final in both instances, but effects were similar when both tokens were utterance-medial. First-mention effects were significantly stronger for words that were lower in frequency in that mother's corpus. These results mean that mothers offer infants a clearer token when most needed, possibly helping to anchor novel phonetic representations.

[OS-2.4]

Parents' hyper-pitch and vowel category compactness in infant-directed speech are associated with 18-month-old toddlers' expressive vocabulary

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The present pre-registered study examined the acoustic properties of infant-directed speech (IDS) as compared to adult-directed speech (ADS) in Norwegian parents of 18-month-old toddlers, and whether these properties relate to toddlers' expressive vocabulary. Twenty-one parent-toddler dyads from Tromsø, Norway participated in the study. Parents (16 mothers, 5 fathers), speaking a Northern Norwegian dialect, were recorded in the lab reading a storybook to their toddler (IDS register), and to an experimenter (ADS register). The storybook was designed for the study, ensuring identical linguistic contexts across speakers and registers, and multiple representations of each of the nine Norwegian vowels. We examined both traditionally reported measures of IDS: pitch, pitch range, vowel duration and vowel space expansion, but also novel measures: vowel category compactness and vowel category distinctiveness.

Results of our mixed models showed that Norwegian IDS is characterized by (a) higher pitch, (b) larger pitch range, vowel duration and vowel space area, but (c) less compact vowel categories, yet (d) comparable distinctiveness of vowel categories as compared to ADS. Further, our beta-regression showed that parents' higher pitch predicted toddlers' vocabulary, $\beta = 0.72$, $p = .003$. However, when examining the acoustic measures of IDS only, parents' vowel category compactness predicted toddlers' vocabulary, $\beta = 0.50$, $p = .049$. In sum, this work provides evidence that IDS to Norwegian toddlers follow the same prosodic characteristics as typically reported in the literature for other languages, including vowel space expansion, previously reported absent in Norwegian parents to 6-month-olds. Yet, parents' vowel categories were more variable in IDS than ADS. Furthermore, the study indicated that increase in IDS pitch (over ADS) as well as vowel compactness in IDS, positively correlated with toddlers' vocabulary, suggesting that parents' increase in pitch when talking to their child and consistency in vowel production, can facilitate early word learning.

[OS-2.5]

Vowel hyperarticulation in Infant-Directed Speech: A Meta-Analysis

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There is a long-standing debate in the literature about whether the vowel hyperarticulation, which refers to speakers' tendency to produce acoustically exaggerated vowels, exists in Infant-Directed Speech (IDS). Therefore, we undertook a meta-analytic approach to investigate the current state of literature regarding the presence of vowel hyperarticulation in IDS. Our meta-analysis was conducted in two steps, with Step 1 including only studies that followed Kuhl et al. (1997) method (17 studies), while Step 2 included all studies on vowel hyperarticulation in IDS no matter the method (33 studies). Additionally, the following factors were assessed: infant-related (age, native language, risk status), method-related (scale, recording context, recording order of IDS and ADS (adult-directed speech), type of elicitation stimulus, interlocutor, method of formant measurement, recording duration), and vowel-related factors (vowel category, number of vowels, word types, word stress). Both Frequentist and Bayesian approaches were implemented, and Hedge's g was calculated as a measure of effect size. The results of both steps demonstrated vowel hyperarticulation in IDS compared to ADS with medium to large effect sizes (Frequentist approach: Step 1: Hedge's g = .62, 95 % CIs: .36 .86; Step 2: Hedge's g = .45, 95 % CIs: .21 .68; Bayesian approach: Step 1: Hedge's g = .34, 95 % CIs: .21 .50; Step 2: Hedge's g = .60, 95 % CIs: .30 .91). Furthermore, the degree of vowel hyperarticulation varied because of different measurement scales (e.g., Herz or logarithmic scales) with implications regarding the cause of vowel hyperarticulation (lowering or raising of formants). Additionally, substantial variability between studies was observed due to vowel-related factors. We recommend disentangling these theoretically relevant effects in follow-up empirical work. In summary, our results indicate the robust presence of vowel hyperarticulation in IDS supporting the proposal that IDS is aimed at scaffolding infants' language acquisition.

[OS-3.1]

Neural correlates of amplitude and formant rise time weighting in infants at- and not at-risk for dyslexia

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Some acoustic properties of the speech signal play a greater role in speech processing than others, a phenomenon known as cue weighting (Holt and Lotto, 2006). For instance, the two phonemes in the /b/-/w/ contrast have similar onset and steady-state formant frequencies but differ along the acoustic dimensions of duration in terms of both formant-frequency rise time (FRT) and amplitude rise time (ART) (Nittrouer & Studdert-Kennedy, 1986). Temporal Sampling theory (Goswami, 2011) proposes that children with dyslexia show impaired phonological processing related to impaired sensitivity to ART cues. This results in the development of phonological representations that encode differently-weighted speech-based information. In a study based on the /b/-/w/ contrast, Goswami et al. (2011) reported that children with dyslexia showed impaired ART but enhanced FRT processing at 9 years.

In this study we compared 20-month-old infants at family risk (AR) or not at risk (NAR) of developmental dyslexia on their neural response in an ART (n = 26 infants) and an FRT cue-weighting task employing the /b/-/w/ contrast (n = 23 infants). Infants were tested in a double-deviant oddball paradigm with Small Deviants and Large Deviants in each task. Of interest was whether AR infants would already exhibit impaired use of ART cues and enhanced use of FRT cues. In the ART task, the NAR group showed a late positive mismatch response (P-MMR) to the Small Deviant, whereas the AR group showed a P-MMR to the Large Deviant. In the FRT task the AR group showed a significant early and late mismatch negativity (MMN) to the Small Deviant. The MMRs suggest that the AR group did not detect the Small Deviant ART at the neural level. However, the AR infants were more sensitive to FRT at the neural level than NAR infants, processing the Small Deviant in a more mature fashion.

[OS-3.2]

Exploring effects of exposure to harmonic and non-harmonic languages on perceptual preferences in infants growing up in Ghana

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Vowel harmony (VH) is a phonotactic constraint that requires similarity between co-occurring vowels. Infants learning a language with VH show a listening preference for VH patterns from around 6 months of age, but not if their language has no VH (e.g., van Kampen et al., 2008). It has been proposed that the acquisition of VH, in spite of its language-specificity, may be facilitated by innate biases (e.g., Finley & Badecker, 2008). The present study investigates how VH preferences are shaped in infants with multilingual experience with languages with and without VH, which is the case for infants growing up in Ghana (West Africa) with exposure in Akan, an Advanced Tongue Root (ATR) harmony language, and non-VH languages (e.g., Ewe, Ga). Two hypotheses are plausible: either these infants will consistently prefer VH if they get at least minimal exposure to Akan, or their preference will depend on the degree of exposure to Akan. Eighteen (of planned 40) 6-months-olds exposed to Akan and additional non-VH harmony languages were tested in Ghana. Auditory preferences were assessed using the single-screen central fixation paradigm (Cooper & Aslin, 1990). Infants were exposed to bisyllabic CVCV nonwords with VH (e.g., pʊtɪ) or without VH (e.g., pɛto). Infants' exposure to harmonic and non-harmonic languages was assessed with a questionnaire and a logbook diary. Preliminary results suggest that infants show slightly longer looking times with harmonic trials (8687ms) than with non-harmonic trials (7849ms), but this difference does not (yet) reach significance ($p>0.05$). Exposure to Akan will be explored to see whether language experience modulates harmony preferences. Gaining insight into how exposure shapes phonotactic preferences in infancy will help us better understand how language experience and potential learning biases influence infants' acquisition of phonology. We discuss methodological issues of field-based experimental infant research, and mobile testing encountered in Ghana.

[OS-3.3]

The consonant-bias is influenced by syllabic position in a familiar word recognition conflict task

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Nespor et al. (2003) proposed that consonants and vowels carry different functions in language processing, vowels being more important for prosodic and syntactic processes and consonants for lexical processes. The consonant-bias in lexical processing (C-bias) is supported by adult/infant studies in several languages including English and French, although some cross-linguistic variations exist (Nazzi & Cutler, 2020, for a review).

The aim of the present study was to evaluate the extent to which French-speaking toddlers exhibit a C-bias during familiar word recognition in a task introducing a conflict between consonantal and vocalic information. To this end, we designed an audiovisual experiment investigating the C-bias during lexical access of familiar words in a group of 24-month-old monolinguals (N = 24). The experiment tested the recognition of a target object among two different familiar objects presented on a screen. In the control condition, the proposed auditory target corresponded to one of the objects presented. In the conflict condition, the target (e.g., /suʒ/) differed from one of the objects by a consonant (C-MP; e.g., /sup/“soup”) and from the other by a vowel (V-MP; e.g., /sɛ̃ʒ/“monkey”), the C-bias predicting that the consonant difference should matter more. Because we wanted to investigate the effect of the position of the C-MP on the observation of a C-bias, stimuli were designed so that half of the C-MPs were located at the word onset and the other half at the word coda. In the control condition, window analyses showed that participants were able to correctly recognize familiar words ($p < .001$), indicating that the task is age-appropriate. In the conflict trials, window analyses failed to reveal a C-bias ($p = .682$). Growth-curve analyses showed significant time-dependent processing differences between the two types of conflict trials, suggesting that the C-bias was moderated by the syllabic position of the mispronounced consonant.

[OS-3.4]

Early word segmentation behind the mask

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Language includes auditory and visual cues relevant to language learning. With COVID-19 the use of face masks became pervasive, affecting the auditory and visual cues available to infants. We investigated the impact of mask use and COVID-related changes in early word segmentation. Seventy-seven 7-9-month-old infants performed an auditory (AUD) and an audiovisual (AV) word segmentation experiment in two conditions: without and with a N95 face mask. Passages and target pseudowords were taken from Butler & Frota (2018) (B&F), who showed that by 4 months infants already segmented targets presented auditorily at utterance-edge position. In AUD we used the visual familiarization paradigm from B&F, which was adapted in AV. Analysis of acoustic and visual cues showed changes in face-masked speech affecting the amount, weight, and location of cues, with edge position less salient than in without mask condition. Results (Fig.1) for AUD revealed no evidence for segmentation, not even at edge position, regardless of mask condition. In AV, looking time during familiarization showed no effect of mask condition. However, infants attended more to the mouth and less to the eyes in without mask than with mask. During test trials, infants attended more to the screen when familiarized with without mask. Thus, mask affected infants' looking patterns. As in AUD, no evidence for segmentation was found. We compared 7-9-monthers segmentation ability observed in B&F pre-COVID study with the current AUD without mask data. Mean looking time for edge was significantly higher than unfamiliar in B&F only. Measures of cognitive and language development obtained with the CSBS scales showed that the infants of the current study scored significantly lower than same age infants from the CSBS normative data. Our results suggest an overall effect of the pandemics on early segmentation abilities and language development, calling for longitudinal studies to determine how development proceeds.

[OS-3.5]

The impact of labels on working memory in 18- and 26-month-old toddlers

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The present study investigated the impact of hearing the names of objects present in the visual field on encoding information about these objects in working memory. More specifically, we tested the impact of object labelling on identity-location binding in 18- and 26-month-old toddlers (N = 120). A novel gaze-contingent eye-tracking paradigm was developed for the purposes of this study. Each trial consisted of a preview, an exposure and a test phase. During the preview phase, participants were presented with a set of open windows, where each window contained a different object. In the immediately following exposure phase, participants were presented with the same set of windows, but the windows were closed. Participants had the opportunity to freely explore the windows, and upon being fixated, the window would open to reveal an object. In addition, fixated objects were either labelled or accompanied by a non-linguistic sound during the exploration phase. Memory for object locations was tested in an immediately-following test phase, where one of the previously explored objects was named. To test whether the effects of labelling depends on working memory load, participants were presented with a set of 2, 3, and 4 windows. The results revealed that the strength of the identity-location binding was affected by the presence of labels. Overall, labels had a negative impact on the performance in 18-month olds, while no such effect was present in 26-month-olds. In addition, these effects were modulated by the level of working memory load. Taken together, these results suggest that the impact of language on working memory changes development, and that labels do not always support information encoding, but that this interaction is shaped by the memory load the stage of language development.

[OS-3.6]

Vocabulary development in blind infants and toddlers: The influence of vision on early vocabulary

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By school-age, blind children develop language largely on-track with their sighted peers (Perez-Pereira & Conti-Ramsden, 1999), yet little is known about early vocabulary development in this population. Prior work has been limited by small sample sizes e.g., Landau & Gleitman, 1985, N=3; Brambring, 2007, N=4), yielding an inconclusive picture of whether blind children experience vocabulary delays (initially or at all) or whether the composition of their vocabulary varies from sighted peers. Here we analyze vocabulary data (CDI; Fenson et al., 1994) from a relatively large sample of blind infants (N=37; 7–57 months), and compare the quantity and composition of their productive vocabulary relative to sighted children, in order to better understand the role of vision in building the early lexicon.

Using the CDI (a parent-report vocabulary survey; Fenson et al., 1994), we first analyzed overall productive vocabulary size. Extending methods used to extrapolate vocabulary beyond the normed range (Campbell & Bergelson, 2022), we compared blind infants' vocabulary relative to the 50th percentile (derived from a large sample of sighted infants; Frank et al., 2017). On average, children with severe-to-profound visual impairments in our sample have a 7 month productive vocabulary delay relative to sighted children ($p<.01$), with wide variability (Range: 44 month delay to 10 month advantage). We next analyzed the composition of early vocabulary in blind and age-matched sighted controls via profile analysis. Alongside considerable child-level variability, we find few overall differences in vocabulary based on part of speech, semantic category, sensory modality, or phonological properties. Taken together, these results show that while there may be initial delays in vocabulary development for some blind children, the composition of these groups' vocabularies are largely similar across several dimensions of lexical organization. These results lay the groundwork for understanding the interactions of vision and word learning throughout early development.

[OS-4.1]

Phonetic Features Excel Acoustics at 14 Months: Naturalistic Evidence from EEG Encoding Models across the First Five Years

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Speech processing is increasingly shaped by infants' native phoneme inventory across early childhood (Kuhl, 2004). The acquisition of this inventory requires infants to first delineate the corresponding acoustic segments from speech. At the neural level, this may be achieved by the tracking of phoneme-rate amplitude modulations of speech, facilitating segmentation and eventual identification of phoneme categories (Goswami, 2019). When and how does categorical knowledge excel the tracking of amplitude modulations during language development?

We recorded the electroencephalogram (EEG) from a sample of n = 75 children aged 0;6–4;6 years. Children heard translation-equivalent stories in their native language (German) and an unfamiliar baseline language (French). From the EEG, we assessed the tracking of phoneme-rate amplitude modulations (6.5–25 Hz) by speech–EEG coherence analysis. Concurrently, we quantified categorical processing through the prediction accuracy of feature-based EEG encoding models (temporal response functions, TRFs). Coherence analysis revealed an increase of phoneme-rate amplitude tracking across age in both the native and non-native language ($t(73) = 4.14$, $p < .001$) and increased amplitude tracking of the native compared to the non-native language ($t(73) = 3.42$, $p = .001$). A significant age × language interaction on the prediction accuracy of phoneme feature TRFs ($t(73) = 3.9$, $p < .001$) suggested that categorical processing increased more steeply across age only for the native language but not the non-native language. Crucially, fitted confidence intervals across the age trajectory detected native categorical processing from age 14 months onwards. We are now employing TRFs to assess the developmental time course of individual features; we hope to present these at the time of the conference. Our findings dissociate the acquisition of a native phoneme inventory from the neural tracking of phoneme-rate amplitude modulations: Native language exposure benefits both acoustic and categorical processing, but features progressively excel acoustics across early language development.

[OS-4.2]

Neural correlates of mutual exclusivity in bilingual and monolingual toddlers

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As young children acquire language, they use several word learning strategies. One strategy is Disambiguation, in which children map a novel word when presented with an unfamiliar referent. Bilingual children do not rely on disambiguation as often as monolingual peers, because they often encounter more than one label for familiar referents. In the present study, we investigate whether bilinguals and monolinguals show brain differences during successful and unsuccessful disambiguation. We hypothesize that differences will emerge when bilinguals do not rely on disambiguation.

Bilingual and monolingual toddlers (N = 52) were presented with a Mutual Exclusivity task, which presents participants with a familiar object (e.g., cup, car) and a novel object (Halberda, 2003). Two types of trials were presented: during Familiar trials, the familiar object was labelled (e.g., “find the cup”); during Disambiguation trials, the novel object was labelled (e.g., “find the dofa”). An eye-tracker measured looking time and functional Near-Infrared Spectroscopy collected brain responses from frontal and temporal cortical regions. Results: Both monolingual and bilingual toddlers’ looking increased to the object following labelling during Familiar and Disambiguation trials (ps < .05). Though not significant, monolinguals were more likely to use disambiguation than bilinguals. Brain imaging. During Familiar trials, children engaged bilateral frontal areas (regions associated with language processing and memory). During Disambiguation, children engaged left temporal areas (regions associated with language processing), and bilinguals showed more left temporal activation than monolinguals. When only the bilinguals with strong disambiguation scores were considered, there were no differences between bilinguals and monolinguals suggesting that brain differences emerge only when disambiguation is not employed. These results provide insight on how the brain supports encoding of a new word. Future work will explore bilinguals’ greater activity when they fail to rely on disambiguation, and which other strategies support bilinguals’ word learning.

[OS-4.3]

Cortical tracking and phase amplitude coupling to sung speech in adults vs infants: A developmental comparison

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Speech contains important temporal information in its low frequencies and the synchronisation or "cortical tracking" of low frequency neural oscillations to the envelope of speech assists in encoding the signal. In adults, neurophysiological signals in the delta and theta bands are known to track the envelope of speech and the phase of these low frequency oscillations also temporally organize the amplitude of high frequency oscillations in a process called phase amplitude coupling (PAC). However, the relative contribution of different cortical frequency bands in infants remains unexplored.

Here we report longitudinal EEG data from 55 infants (BabyRhythm study), when aged 4-, 7- and 11- months, as they listened to nursery rhymes. After establishing the presence of stimulus-related neural signals (PSD), multivariate temporal response function (mTRF) analysis measured the strength and maturation of cortical speech tracking. Normalised modulation index (nMI) assessed PAC. We replicated this experiment with 21 adult participants, investigating whether delta and theta cortical oscillatory networks differ when tracking speech stimuli in the infant and adult brain. Peaks in stimulus-related spectral power (PSD) were different in the two populations. In Infants, PSD peaks were observed at ~2.20Hz and ~4.37Hz with a developmental maturation of the 4.37Hz peak. Stimulus-related increases in PSD power were present in the adult data at these frequencies, but PSD peaks were found at ~1.25Hz and ~8.54Hz. Both infants and adults showed significant cortical tracking of the sung speech in both delta and theta bands but not in the alpha band. Furthermore, delta band values were significantly greater than values in the theta band in both populations. PAC was stronger for theta- versus delta-driven coupling in adults but was equal for delta- versus theta-driven coupling in infants. These results suggest that cortical speech tracking mechanisms are present early in infancy but undergo developmental change into adulthood.

[OS-4.4]

Infant neural entrainment to complex musical and speech stimuli: association with language acquisition and impact of early rhythmic training

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Neural entrainment is defined as the process whereby brain activity, and more specifically neuronal oscillations measured by electroencephalography (EEG), can synchronize with external (exogenous) stimulus rhythms. Recent theories suggest that individual differences in this phenomenon lead to atypical development trajectories of language acquisition. Preliminary evidence suggests that infants' neural entrainment to easy rhythmic patterns can be influenced by their early musical experiences.

The present study has a twofold aim. First, we aimed to investigate infant neural entrainment to complex non-speech (musical) and speech rhythmic stimuli, and its relationship with language acquisition. Second, we investigated the impact of an ecological early rhythmic training on the same measures of neural entrainment. 25 8-month-old infants have been so far included in the study. Their EEG signals were recorded while they passively listened to non-speech and speech rhythmic stimuli modulated at different rates. After the assessment, 12 infants participated to the early rhythmic training whereas 13 did not. The training provides exposure to and active synchronization with complex musical rhythms. It took place in small groups of infant-caregiver pairs for 1 hour/week for 6 weeks. All infants were tested again with the same neural entrainment task after six weeks. In addition to the EEG task, all infants underwent an assessment of language skills. Neural entrainment to the incoming rhythms was measured in the form of peaks emerging from the EEG spectrum at frequencies corresponding to the rhythm envelope. The visual inspection of the averaged EEG spectrum revealed clear responses above the noise floor at frequencies corresponding to the rhythm envelope, suggesting that infants' brain at 8 months of age was capable to entrain to the incoming complex auditory rhythms, for both music and speech. Further analyses are still ongoing and the final results will be presented at the conference.

[OS-4.5]

The rhythm takes it all: A developmental approach to bilingual listeners' cortical tracking of speech after brief exposure to music.

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This study investigates the effects of rhythmical musical cues on cortical tracking of speech. We adopt a developmental and cross-linguistic approach by including bilingual Spanish-Basque infants and adults and using Spanish and Basque speech stimuli. We predict that brief exposure to regular musical rhythm that reflects the prosodic structure of speech in each language (Delta band, ~2Hz) will facilitate cortical tracking of speech in the two participant groups.

Neural responses to music sequences and spoken sentences were recorded using electroencephalography in 6-month-old Basque-Spanish bilingual infants (expected N=18; preliminary data analyzed N=7) and adults (N=31). Participants heard 64 Basque and Spanish sentences (produced in infant-directed speech to a 120-bpm metronome beat), which were preceded by one of the following musical sequences. Matching-regular sequences reflected and matched the rhythmic structure and melodic contour of the sentences. Mismatching-regular sequences followed a regular rhythmical pattern, but their beat structure did not match the sentences' rhythmic structure. Finally, irregular sequences matched neither the rhythmic structure nor melodic contour of the sentences. To reduce the experiment duration, infants did not complete the mismatching-regular condition. Oscillatory activity in Delta (~2Hz) and Theta (~5Hz) frequency bands in response to the musical sequences and speech were analyzed. Adults and infants showed stronger cortical tracking to regular than irregular sequences across frequencies (adults: matching- and mismatching-regular; infants matching-regular). Cortical tracking to speech was stronger when sentences were preceded only by matching-regular musical sequences, and only in the delta band, reflecting a processing benefit in speech led by rhythmic musical information. Cortical tracking to speech was modulated and facilitated when preceded by sequences with identical rhythmic structure. These preliminary analyses point to a positive influence of brief exposure to regular rhythms on infants' and adults' cortical tracking of speech in the delta band, which carries prosodic information in speech.

[OS-5.1]

Early bilingual experience constrains attentional development

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Infants adapt to the external world by sampling it. The more variable the environment, the more sampling is required. Infants who regularly hear two or more languages are likely to be exposed to more varied language input than infants who regularly hear one language. These 'bilingual' infants are also likely to receive less input from each language. Given these exogeneous sampling constraints, how do bilingual infants keep pace with their monolingual peers? We propose that they do so partly by placing more weight on gathering sensory evidence and rapidly switching attention between competing stimuli such as the objects they are handling and speakers' mouths. Whereas monolingual infants may be drawn to familiar stimuli so they can build detailed representations of their environment, bilingual infants may err on the side of exploration and collect more samples from their more varied environments. These would include visual samples, because visual input (such as lip movements) facilitates language learning. In support of our proposal, we previously found that infants raised in bilingual homes switch attention between visual stimuli faster and more frequently than infants raised in monolingual homes (D'Souza et al., 2020). Here, we go one step further and present unpublished (moment-by-moment) eye tracking data that provides insight not only into a potential trade-off in bilingual infants between placing more weight on (novel) sensory evidence vs. the processing (exploiting) of familiar information, but also whether infants adapt to bilingual contexts by developing weaker, albeit more plastic, internal models of their more variable, less predictable environments.

[OS-5.2]

Children's exposure to language switching in bilingual homes across two communities

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Language switching is a key characteristic of bilingual children's language input. In the few studies that have investigated switching, some suggest that it occurs often (Bail et al., 2015), while others find that switching is overall infrequent (Kremin et al., 2021). These studies differ in key features, however, including the bilingual community studied, and the context of interaction (in-lab play with a primary caregiver vs. full-day home recordings with multiple household members). Here, we directly compare switching across two bilingual communities to describe diversity in young bilingual's everyday language input. Data from forty 18-35-month-old toddlers from Spanish-English homes in the United States (N=20) and French-English homes in Canada (N=20) were analyzed. We recorded children at home (via Zoom) during two 10-minute play sessions, one with just their primary caregiver and another with additional household members present (e.g., other parents, siblings, nannies). To quantify switching, we calculated per-minute values of: a) any switches that occurred, b) within-speaker switches, and c) across-speaker switches. While switching patterns were similar across the two communities during the first session, we found different patterns of switching with multiple speakers present. In the Spanish-English community, we found no significant difference in the number of switches-per-minute that occurred within-speakers (M=2.87, SD=2.00) or across-speakers (M=4.36, SD=3.76), $p = .30$. In contrast, French-English children encountered significantly fewer within-speaker (M=1.77, SD=1.02) than across-speaker switches (M=6.23, SD=4.18), $p = .003$. Closer examination of switching patterns revealed that a primary source of variation - across communities and days - was in individual differences across families. Overall, this study provides the first direct comparison of the dynamics of switching across bilingual communities and highlights the importance of considering the nature of switching that children are exposed to.

[OS-5.3]

Infant Exposure to Speech in Multicultural Environments

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Early multilingual language environments are traditionally characterised by measuring the quantity of language exposure based on parental questionnaires (e.g., Cattani et al., 2014); language exposure from these reports is predictive of infants' concurrent and later linguistic achievements, such as vocabulary development (E.g., Hoff et al., 2012). However, little is known about the actual amount of exposure multilingual infants receive in each language, and the amount of Infant directed speech (IDS) they are exposed to (Orena et al., 2019; Cychosz et al., 2021).

With research showing that greater amounts of IDS tend to predict language outcomes (E.g., Ramirez-Esparza et al., 2014), and that female caregivers in monolingual settings tend to produce more IDS than male caregivers (Bergelson et al., 2019), it is possible that infants growing up in homes adopting the one-language, one-parent policy may hold larger vocabularies in their mothers' language. The current study aims at using day-long recordings with multilingual families to measure the quantity of both overall language exposure and IDS infants receive from each caregiver. We asked 15 multilingual families, raising their 6-20 month old infants in London to record their home language environments for two full days. Using ELAN (Brugman et al., 2004) and following the ACLEW guidelines (Soderstrom et al., 2021), we are analysing our data (60 minutes per family over 2 days) to estimate the quantity of language input, and IDS in each language relative to the gender of the caregiver. Once completed, our analyses will contribute to our understanding of multilingual caregiver language behaviours and If our data is coherent with previous studies, (E.g., Bergleson et al., 2019), we may report a pattern of higher exposure to both overall speech and IDS in the mothers' L1.

[OS-6.1]

Consistency and reporting in preprocessing and analysis of infant ERP data - a systematic review

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Event-related potential (ERP) data have to undergo complex preprocessing and analysis pipelines. To set up this pipeline, ERP researchers have to make many decisions, introducing analytic flexibility. Recent studies have examined this flexibility, its consequences and ways to reduce it in the adult ERP literature (e.g., Šoškić, et al., 2020; Sandre et al., 2020). However, these problems also apply – perhaps even to a greater extent – to infants' and children's ERP data, which has received little attention with regard to analytic flexibility so far.

To address this problem, we conducted a systematic review to assess common practices in infant ERP preprocessing and analysis steps. We focused on papers investigating the well-studied N400 component in one of its most common applications, word learning, in pre-school children (0-5 years). We identified 31 papers using a PubMed literature search. We analyzed 47 practices of these studies, including properties of preprocessing steps and statistical analysis. For each of these practices, we investigated its implementation and reporting. Worryingly, we found that each study used a unique preprocessing and analysis pipeline. Individual practices differed greatly in how they were implemented and reported, with some practices being reported perfectly according to commonly accepted reporting guidelines, and others not at all. In addition, we show what effect different preprocessing decisions have on the ERP data. We will discuss what infant ERP researchers can do to increase reporting and consistency in preprocessing and analysis steps, highlighting how to deal with the unique challenges of infant data. We hope to raise awareness that (1) infant ERP studies can only be reproducible when preprocessing and analysis steps are consistently reported, (2) the many decisions researchers have to make during preprocessing and analysis can influence the results, and (3) we should strive towards standardized preprocessing and analysis pipelines to make results comparable.

[OS-6.2]

The (null) effect of socio-economic status on the language and gestures of young infants: Evidence from British English and eight other languages

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In industrialised societies, children from families with lower socio-economic status (SES) are more likely to have slower language growth. However, most evidence comes from older children. The few studies we have from children under three yield contradictory results; partly because many do not sample a diverse group of children, and partly because the impact of SES differs across societies.

In this study, we used a new parent report instrument (UK-Communicative Development Inventory) to assess the effect of SES on language in British English children aged 8-18 months (N=1210). Our sample matched key characteristics of the UK population including SES. We extracted two SES measures; a single composite scores generated via Principle Component Analysis from a range of SES-related variables (income, occupation, education etc), and a maternal education score. We found no effect of SES on vocabulary production or gestures in 8-18 month olds. However, there was a significant interaction between SES and age for comprehension;. Early on, low SES parents reported that their children knew more words than high SES parent but the difference reduced over time. In comprehension, which is difficult to assess accurately, this reverse SES effect is usually attributed to reporting bias (e.g. Feldman et al., 2000). We found the same pattern in equivalent data from US English children using maternal education as SES proxy. We then compared our comprehension data with that from other languages reported in Frank et al. (2001), following them in calculating non-parametric effect sizes (MMAD). In eight of the nine languages (UK & US English, Mexican & European Spanish, Mandarin, Portuguese, Latvian, Norweigan) there was no evidence of slower language growth in children from lower SES backgrounds. In sum, although children from lower SES backgrounds may have slower language growth, substantial differences do not emerge until after the first year of life.

[OS-6.3]

COVID-19 first lockdown as a window into language acquisition: associations between caregiver-child activities and vocabulary gains

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The COVID-19 pandemic, and the resulting closure of daycare centers, led to unprecedented changes in children's learning environments. This period of increased time at home with caregivers, with limited access to external interaction provides a unique opportunity to examine the associations between caregiver-child activities and children's language development.

At the onset of the first lockdown, in March 2020, across 13 countries (Norway, Spain, the Netherlands, UK, USA, Germany, Israel, Saudi Arabia, Canada, Turkey, Russia, Poland and France) and 12 languages, 1742 parents to 8-36-month-old infants completed language-specific standardized vocabulary checklists (CDI) indicating the words their child understood (for 8-16-month-olds) and produced (for all infants). Parents were contacted again at the end of the lockdown and asked to estimate the amount of time their child was involved in activities (alone or with a caregiver) such as shared book reading, structured child-caregiver games, free play with the child, singing, one-to-one speaking, time spent outdoors, passive screen exposure (watching baby TV, cartoons, shows, with no interaction with a digital device), playing baby games on a digital device, time spent playing without an adult – on a 10-point scale ranging from "did not do this activity at all" to "more than 4 hours most days". Parents were also asked to complete the same vocabulary checklist again, so we could calculate the number of words learned throughout lockdown. The results revealed that children who had less passive screen exposure and whose caregivers read more to them showed larger gains in vocabulary development during lockdown (ps < .01), after controlling for SES and other caregiver-child activities. Overall, children gained more words than expected (based on normative data) during lockdown ($p < .01$); suggesting that either caregivers were more aware of their child's development, or vocabulary development benefited from intense caregiver-child interaction during lockdown, or both.

[OS-6.4]

Vocabulary size lag in UK bilingual toddlers relative to monolinguals in both comprehension and production

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The literature on early vocabulary growth in bilingual toddlers distinguishes between single-language vocabulary and conceptual vocabulary when comparing bilinguals' vocabulary size to that of monolinguals. Unlike measures of single-language vocabulary which only count words known in one tested language, bilingual toddlers are said to know a concept if they know the word in either of their two languages. Many studies have found that bilinguals' single-language vocabulary lags behind monolinguals' vocabulary, but their conceptual vocabulary falls within the normal monolingual range. We compared 12 to 32-month-old bilingual toddlers growing up in the UK with English and one additional language (AL) (N = 413) to age-matched UK English monolinguals (N = 797). We evaluated vocabulary size in English and conceptual vocabulary. Bilinguals' English vocabulary sizes in both comprehension and production were significantly smaller than monolinguals' after controlling for age and socioeconomic status. This was seen across bilinguals with different levels of language dominance. The bilingual lag in vocabulary size was smaller when calculated using conceptual vocabulary but still significant for both comprehension and production. This did not converge with our predictions that conceptual scoring would eliminate the difference in vocabulary size between monolinguals and bilinguals. To identify if this group difference was driven by outliers, we compared bilinguals' conceptual vocabulary size to percentiles in monolingual norms. Percentiles for each age (in months) were calculated using English vocabulary data from our monolingual sample. We found that a proportionally large number of bilingual toddlers (36.8%) in our sample had vocabulary sizes that fell below the 20% percentile of same-age monolingual norms, even when vocabulary size was calculated using concepts. Further investigation is required to identify the source of the vocabulary lag in bilingual toddlers and how appropriate interventions can be formulated to help their early language growth.

[PS-1.1]

Caregivers' Language Attitudes and Code-Switching Habits in Multilingual Environments

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Code-switching is a linguistic phenomenon that is pervasive in multilingual communities (Ritchie & Bhatia, 2013) and has been observed in the input to multilingual infants in laboratory settings (e.g., Bail et al., 2014), and recently in naturalistic home environments (Kremin et al., 2021). Whilst Kremin et al. (2021) reported caregivers' code-switching habits increase as infants grow older, the predictors behind why caregivers code-switch are yet to be explored. The current study aims at examining one potential factor that may predict caregivers' code-switching habits: their attitudes towards their languages.

Using ELAN (Brugman et al., 2004) and following the ACLEW guidelines (Soderstrom et al., 2021), we are currently annotating 12 x 5 minute samples (over 2 days) from day long recordings of 15 London based multilingual families. In addition, caregivers were asked to fill out a language attitudes questionnaire (Baker, 1992; Dewale, 2012; Young & Tren,1999) measuring attitudes towards their L1 and L2 across 3 themes: emotional feelings, importance to life and importance to bringing up their infant. We plan to measure the frequency of code-switches caregivers produce in their input, where these switches occur (intra and inter-sentential), and what attitudinal factors in the three themes towards their L1 may explain their code-switching behaviours. We would expect caregivers who rate their L1 and L2 highly to code-switch more in between sentences (inter-sentential); for example, one way parents have been known to use code-switching is to bolster infants' understanding using translation equivalents (Byers-Heinlen, 2013). If parents ascribe high importance to both their L1 and L2 for raising their child multilingually, we may expect them to exhibit behaviours such as this. In turn, if caregivers rate their L1 higher on the emotional scale, they may be less likely to code-switch, therefore infants may experience code-switching between caregivers rather than from the same caregiver (intra-sentential).

[PS-1.2]

Caregivers differ in verbal and nonverbal responsiveness during early play

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During early play, an infant may reach for a doll. Their caregiver smiles and hands over the doll while saying "Here is your doll". Caregivers respond to infants using verbal and nonverbal behaviours. Previous studies found caregivers' verbal responsiveness positively relates to children's vocabulary development (e.g., Tamis-LeMonda & Bornstein, 2002; McGillion et al., 2013). These studies focused on verbal responses, while certain nonverbal behaviours, such as handing over a toy, also predict language outcomes (Ruddy & Bornstein, 1982). We do not know which nonverbal responses frequently occur during early play and whether nonverbal responsiveness is a source of variability among caregivers.

We observed 117 Dutch caregivers and their infants (66 girls, mean age 10.4 months) for six minutes of free play. We developed a coding scheme to annotate infants' vocalisations and gestures and caregivers' contingent verbal (e.g., labelling, imitation), gestural (e.g., pointing, passing), facial (e.g., smiling, surprise), and bodily (e.g., leaning closer) responses. We achieved high reliability among coders ($k > 0.79$). We observed 2,022 infant behaviours of which 87.1% received a response. Most responses were verbal: semantically incontingent (n=722) (e.g., affirmation), follow-in (n=663) (e.g., labelling an object of interest), and infant imitation (n=127). We also annotated gestures: showing (n=101), passing (n=74), and pointing (n=60). Caregivers sometimes started smiling (n=162) or showed affection (n=36). Finally, we examined whether caregivers differ based on verbal (range 22%-100%) and nonverbal (range 7%-83%) responsiveness rates. The ranges indicate large individual differences. A correlation test shows there is no relation between verbal and nonverbal responsiveness ($r = -0.02$, $p = 0.58$). Caregivers use a range of verbal and nonverbal responses during early play. They show large variability in verbal and nonverbal responsiveness. Since nonverbal responses form an additional source of variation, they are important to consider when assessing relations between caregiver responsiveness and children's development.

[PS-1.3]

Infant-Directed Communication: Examining the multimodal dynamics of infants' everyday interactions with caregivers

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Everyday caregiver-infant interactions are dynamic and multimodal. However, current investigations into how input quality impacts learning have focused predominantly on infant-directed speech (IDS). While speech is a ubiquitous feature of infants' experience, comprehensive theories of how infants' real-world experience influences learning must consider that infants' everyday input comes from a variety of interconnected signals across domains. For example, infant-directed modifications in action, gesture, emotion, and touch have independently been shown to promote infants' engagement and learning (e.g., Brand et al., 2002; Iverson et al., 1999). To better account for the multimodal nature of caregiver-infant interactions, our goal is to augment research on IDS by investigating "infant-directed communication" (IDC): the suite of communicative signals from caregivers to infants including speech, action, gesture, emotion, and touch. We asked 44 caregivers and their 18- to 24-month-old infants (predominantly white, middle-class, in the U.S.) to play for 10 minutes while being recorded on Zoom. Videos were coded for IDC using previously validated methods. We found that multiple, overlapping dimensions of IDC occurred throughout the 10-minute interaction. In fact, significantly more than half of the speech that infants heard (M = 64%, SD = 12%) was accompanied by one or more non-speech signals, $p < .001$. Further, while speech alone was not predictive of vocabulary size ($p = .35$), caregivers used more IDC when interacting with infants who had smaller vocabularies ($p = .003$). Thus, caregivers may tailor their use of IDC to their child's abilities, perhaps in a way that enhances learning over time. Overall, harnessing variability in multidimensional caregiver input provides new insights into the true richness of infants' everyday social interactions. This work has set the stage for ongoing investigations into links between IDC and neural or behavioral caregiver-infant synchrony and how caregivers' use of IDC varies across contexts, communities and cultures.

[PS-1.4]

Infant-directed speech supports phonotactic learning in German

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Infant-directed speech (IDS) is claimed to have characteristics which facilitate infants' learning of phonemes (Kuhl et al., 1997). Our study examined whether IDS also provides cues for learning phonotactics (i.e., probabilities of phoneme co-occurrences). Phonotactic acquisition may be facilitated by biases such as the Sonority Sequencing Principle (SSP; Berent et al., 2011), which proposes that steeper sonority rises (big difference between sonority index of consonant2 and consonant1; /blik/) are more well-formed than flatter ones (small difference; /bnik/), while plateaus (no difference; */bdik/) and falls (negative difference; */lbik/) are ill-formed. Even newborn listeners seem to prefer SSP-conforming structures compared to SSP-violating ones (Gomez et al., 2014). However, it has not yet been shown if IDS provides enough cues for an SSP generalization.

We performed corpus-based lexical statistics in German, a language described as following the SSP (Wiese, 1988). Using word-initial consonant clusters in speech to 0;6 to 1;8 infants (Stärk et al., 2021), and in adult language (Baayen et al., 1995), we fitted Poisson logistic regression models to determine if sonority contour and index difference predict a cluster's type frequency. Following the SSP, more well-formed clusters should have higher type frequency. Additionally, we investigated how this changes in "s"/"sh"-initial clusters which seem to be exceptions (Goad, 2011). The results show that sonority falls are absent in both IDS and adult lexicon. In IDS, clusters with a rising contour (Est.=0.97, SE=0.41, p=0.02) and bigger index difference (Est.=0.53, SE=0.22, p=0.02) have higher type frequencies; but not in "s"/"sh"-initial clusters. However, the adult lexicon shows no significant effects. Overall, German generally follows SSP as sonority falls are avoided. Moreover, IDS seems to present more consistent evidence for the SSP compared to the adult lexicon. This suggests that IDS is specifically tailored for infants to learn the SSP, which can guide their phonotactic acquisition.

[PS-1.5]

Infants' social preference for artificially sounding native speakers and robot agents

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Research showed that 6-month-old infants preferred to look at social interaction partners who spoke in the infant's native language with a native accent compared to a foreign accent (Kinzler et al., 2007). In the present online study, we tested whether this preference relates to familiarity at either a detailed acoustic form level or a more abstract linguistic form level. We paired natural speech and artificial speech with human speakers and robots. In EXPERIMENT 1, 26 infants (M = 16 months, SD = 4.3 months, 14 female, monolingual German) attended a preferential looking paradigm. In a familiarization phase, infants saw two caucasian female agents individually in a short video sequence narrating a 15 seconds long story with the same voice. The voice was presented either in naturally sounding German (agent A) or in artificially (robot-like) sounding German (agent B). In a test phase, both speakers were presented as still pictures next to each other. Proportion index for infants' gaze directions in the test phase was calculated while controlling for baseline looking times. Preliminary results indicated that infants showed no preference for agent A compared to agent B, $t(25) = 0.5$, n.s. In EXPERIMENT 2, the same paradigm was repeated with a second group of 19 infants (M = 14 months, SD = 6.5 months, 8 female, monolingual German). As the single difference to EXPERIMENT 1, human agents were replaced by robot agents. Again, overall infants did not prefer the robot speaking in naturally sounding German over the artificially sounding robot, $t(18) = 0.1$, n.s. However, consecutive analyses indicated that a preference for the robot agent speaking with natural speech was positively correlated with age, $r(17) = .41$, $p = .05$. These data suggest that early language preferences might be rather driven by abstract linguistic form cues than by pure acoustic familiarity.

[PS-1.6]

Parents' cell phone usage and young children's language development

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Most research in the field of social media analyses the effects of their use in children instead of focusing on the parents' screen time. Parental screen time could affect children's language development in various ways, by reducing the number of exposure opportunities and/or disrupting learning interactions (Reed, Hirsh-Pasek, & Golinkoff, 2017). In two studies we investigated whether parental screen time affected toddlers' language development. In the first study, parents of 117 children aged 8 to 36 months completed the Oxford Communicative Development Inventories (CDI) prior to completing a questionnaire estimating their own daily screen time. Results showed that the more time parents spend on screen while their child is around, and the less words children produce. In the second study, fifty-five children aged 19 to 26 months took part and their parents were asked to report their smartphone usage by answering a daily questionnaire. Due to the COVD-19 restrictions, 32 children performed the language assessment test, the WinG test (Cattani, Krott, Floccia, & Dennis, 2019) online via the Zoom application. Then, 23 children did the WinG test face-to-face at the University Babylab. The WinG test consists of a series of 3 cards depicting common objects, and participants were asked to point to which one corresponds to a word produced by the experimenter (e.g. 'dog'). It provides a measure of comprehension and production for words and predicates. Results collected so far do not provide indication of parental screen time effects on children's language development. It was found that parents reported spending on average 8 min per day on their phone while their child is around, which might not be significant enough to impact children's vocabulary. However, this contrasts with data from the first study where parents reported an average of 1.14 hours of daily screen time while with their child.

[PS-1.7]

Size Sound Symbolism in Mothers' Speech to their Infants

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Six-month-olds infer object size based on pitch: high-pitched sounds map onto smaller objects and low-pitched sounds onto larger objects (Fernández-Prieto et al., 2015; Peña et al., 2011). The 'sound symbolism bootstrapping hypothesis' (Imai & Kita, 2014) proposes that this supports early understanding of word-meaning correspondences; by drawing on iconic pairings between prosodic or phonological cues and their corresponding referents, infants first form iconic word-meaning associations and later more arbitrary associations. For this sound symbolism to be useful in word learning, associations between size and pitch must be present in the infant's input. We test this in a pre-registered study, using naturalistic data of British caregivers interacting at home with their 14-month-olds in a toy-play scenario.

We present data from 43 mother-child dyads engaging in 30 minutes of free-play with a selection of toys and household objects. Wherever two different-sized objects appear in the same play scene or home routine (e.g. a small doll and a large teddy) and are labelled by the caregiver, we expect pitch differences to reflect actual object size differences (e.g. smaller doll will be labelled with a higher pitch than larger teddy). Interactions were video-recorded, and object labels were coded in ELAN for size. Labels were then extracted; automatic acoustic analysis in Praat determined raw mean fundamental pitch of the stressed syllable in each object label. The analysis also takes into account utterance type (question, statement, etc.) and whether the word bore tonic stress. Coding and acoustic analysis is now complete and reliability checks are underway prior to statistical analysis. Following the sound symbolism bootstrapping hypothesis (Imai & Kita, 2014), we expect caregivers to produce words for smaller items with a higher pitch, and larger items at a lower pitch. Results will help clarify the extent of sound symbolic cues in English-learning infants' early input.

[PS-1.8]

The role of caregiver feedback on early vocalisations: Investigating infants' phonological development following cochlear implantation

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Infants using a cochlear implant (CI) have delayed auditory access to their speech environment and fewer phono-articulatory matching opportunities (Majorano et al. 2020) when compared to typically-developing (TD) infants. The Articulatory Filter Hypothesis (AFH) suggests that the processes of perception and production are intertwined and, as such, play a crucial role in early phonological development. This research investigates whether the consonant productions of CI infants have phonetic resemblances—or contingency—with the properties of preceding caregiver speech. The speech data—from the Ambrose-Moeller (2016) Corpus—included six CI infants and six age-matched controls of spontaneous mother-infant interactions. Contingency was measured using a matching coding system which quantified the degrees of resemblance between infant and adult vocalisations.

A t-test showed that the contingency between maternal input and cochlear-implanted infants' production of stop consonants was not significantly different to age-matched controls when standardised scores were used, despite being very close to the significance threshold ($p=0.0563$). Impressively, this central outcome was found despite a relatively short duration of device use: CI infants had 5 months of hearing experience versus the 13 months of non-interrupted hearing experience TD infants had. Although no significant difference was found regarding contingency scores, CI infants deviated from TD infants in their non-contingent responses/production patterns, with the features of voicing and phonological structure having a reversed distribution across groups. The research extends the AFH framework onto a new population and supports recent work, e.g., the triggering effect of cochlear implantation on babbling (Löfkvist et al. 2019); the variability of consonant productions as a result of physiological factors (Kent 2021). Research findings also add weight to the importance of visual input for successful speech acquisition (Ertmer and Jung 2011) and present the voicing distinction as less salient to CI infants in early phonological learning than is documented in typical development.

[PS-1.9]

The role of mother-infant emotional synchrony in speech processing in 9-month-old infants

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Mother-infant interactions follow a rhythmic structure that might lead to interpersonal synchrony, such as the matching of emotional expressions (Feldman et al., 2011). Similarly, language is rhythmic, and infants make use of rhythmic information for segmenting words from fluent speech (Jusczyk et al., 1999). We investigated whether and how mother-infant emotional synchrony relates to infants' word segmentation, as an early marker of language development. We hypothesized that higher levels of emotional synchrony are linked to better word segmentation.

Twenty-six 9-month-old infants and their German-speaking mothers participated in the study. To measure emotional synchrony, we calculated the time in which mothers and their infants showed the same emotional expression (i.e., positive, neutral, or negative) during 5 minutes of free play. Then, we examined infants' word-segmentation ability with a central fixation paradigm (Cooper & Aslin, 1990) using eye-tracking. Stimuli were based on Bartels and colleagues (2009). We familiarized infants with auditory text passages in German and measured looking times while listening to familiar versus novel test words. Following cross-recurrence quantification analysis, we used entropy (ENTR; degree of predictability characterizing the dyadic system) and recurrence rate (RR; tendency of the dyadic system to repeat itself) as measures of emotional synchrony. Regression modelling included Log transformed looking times for test trial as dependent variable; ENTR, RR, Trial type (novel vs. familiar) as fixed effects; and Participant as random effect. Results revealed that ENTR, but not RR, interacted with trial type: the lower the entropy during interaction, the longer infants looked during presentation of novel compared to familiar words at test, indicating successful word segmentation. Thus, individual differences in infants' word segmentation relate to the complexity and predictability, rather than the overall recurrence rate, of emotional synchrony during mother-infant interactions. This highlights the important role of shared emotions in infant language acquisition.

[PS-1.10]

A Baby Test Toy as a new method for testing infants' auditory preferences

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Behavioral infant language studies most widely use the head-turn preference (Kemler Nelson et al., 1995) and the central fixation paradigm (Cooper & Aslin, 1990), which are ideal for testing very young infants, but restricted to laboratory settings. This poses limits on our field's goal to diversify our research by including infants who typically do not come to a lab (see the https://manybabies.github.io/MB-AtHome/ project). Inspired by 1960-1980s research (e.g., Friedlander, 1968; Glenn & Cunningham, 1983), which used playpen installations with switches that infants could manipulate to elicit speech sounds for revealing auditory preferences, we set out to develop a modern test toy for testing infants at home.

Our test toy is small box with two buttons infants can easily press by 9 months of age. A built-in software is programmed such that a button press triggers the playback of a sound. Button press counts and press durations are recorded. So far, we obtained data from 21 9-to-11-month-old German-learning infants. Stimuli were a trochaic (/GAba/) and an iambic (/gaBA/) nonword, as German-learning infants typically show a trochaic listening preference (Höhle et al., 2009). Experimental sessions (free playtime with the caregiver in presence) usually take 10-15 minutes and end once the infant disengages. Fourteen of 21 infants pressed longer the button that played the trochee (mean pressing time: 72.5s) than the one that played the iamb (69.1s). Regression modelling was used to assess which factors (e.g., handedness, time, age, instruction) modulate infants' pressing times by condition (trochee/iamb). We found no main effect for condition, but an effect for age ($p=.02$) suggesting longer play times with increasing age, and an instruction*condition interaction ($p=.01$) suggesting that infants' preferences were influenced by the button the experimenter showed first. These promising results motivate us to continue probing procedures for investigating infants' auditory preferences with our test toy.

[PS-1.11]

A resource of word associations in 3-year-olds which are not captured by adult associative norms

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This study presents a list of the most common, noun-noun related responses produced by 3-year-olds in a word association task. These might be used in the experimental design of future studies investigating the development of meaning in infancy.

This study sought to investigate whether 3-year-old children could understand and complete a word associations task, and whether the responses would be 1. related, and 2. similar in nature and magnitude to the word associations found in the adult literature. Experiment 1 (n= 151) tested children performing the free association task at home, with a parent/ carer as the experimenter. Experiment 2 (n= 24) adapted Experiment 1 into an online task which auditorily recorded participant responses and used videos of puppets to demonstrate the task. Experiment 3 (n= 19) tested bilingual 3-year-olds, to measure the rate of translation equivalents used as related responses. Findings revealed that there was no significant difference in the response types and associative strengths when the task was conducted by a parent/ carer or when conducted online, nor was there any difference between responses in monolingual and bilingual children. Together this indicates that monolingual and bilingual children as young as 3 can successfully produce related responses in a free association task, where most responses are related, and many replicate the exact word combinations found in the adult literature. However, a large proportion of the most common related word pairs in 3-year-olds were not represented in adult associative norms and this suggests children might have different word associations as their lexical-semantic networks are still developing into a mature system. For this reason, one must be cautious when relying on adult associative norms for stimuli selection as the absence of associated word pairs in the adult data is not analogous to their absence in the emergent lexical-semantic system of children.

[PS-1.12]

Alignments between direct tablet-based assessment of word comprehension and parental reports depend on the child's age and word types

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Parental reports are frequently used to index toddlers' vocabulary sizes and to track language development to detect delays. However, little research assessed the reliability of parental reports, as compared to infants' direct measures of word comprehension, and whether it is affected by word types used in the task. Here we present two studies that used tablet-based word comprehension tasks as direct measures of word comprehension in children, and compare their performance to parental reports. In study 1, forty-nine 18-20-month-old Norwegian toddlers were prompted to touch the labelled target out of two displayed items that were either semantically related (e.g., dog–cat) or unrelated (e.g., dog–airplane). Toddlers performed better in the semantically unrelated condition, $\chi 2=6.78$, $p=.009$, suggesting that their word representations are still semantically coarse. Parental reports of word comprehension predicted toddlers' performance, $\chi 2=18.10$, $p<.001$, with parent–child agreement stronger in the semantically unrelated condition, indicating that parents declare a word to be known by their child if it is understood at a coarse representational level. In study 2, forty-nine 2-5-year-old Norwegian children were administered a similar task for emotion word comprehension, in which they were prompted to touch the picture of a face displaying the labelled emotion (e.g., happy) among four possible choices (e.g., happy, sad, scared, surprised). Toddlers recognised 55% of emotion words, but parental reports of comprehension did not reliably predict their accuracy ($p<.1$). However, the significant interaction between emotion word production and children's age ($c2(1)=4.63$, $p<.05$) suggests that emotion word knowledge is more reliably indexed by parents of older children. Together, these studies suggest that the reliability of parental reports of word comprehension vary across word types, task complexity and age. This set of studies emphasises the need of further research into the reliability of parental reports to index a child's language development.

[PS-1.13]

Development of a touchscreen based language measure for French toddlers

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Evaluating young children's language development in a direct, quick, and reliable way outside of the lab is still challenging.

We expand on previous efforts to develop a touchscreen based language test of word comprehension (Friend & Keplinger, 2008, Lo et al., 2021), by adding a novel word learning and a phonological neighbor distinction task to tap into language processing and phonological representation. We aimed to develop a test short and engaging enough to be easily administered in non-lab settings. We piloted our test with 36 children, aged 19-33 months, in several daycares from the Paris region (varied SES and language exposure). Our preliminary results show that children find the test engaging, despite it taking about 20 minutes to finish, with children completing on average 83% of the test (Mdn = 100, SD = 29.4), and actively answering for 77.5% of those trials (SD = 22). Their average percentage of correct answers was above chance (M = 0.73, SD = 0.15), and showed a weak correlation with age (R = 0.36, p=0.03), without showing a ceiling effect for older children. This pilot demonstrated the feasibility of the test in daycares: with a relatively short playing time and high completion rate, minimum set-up requirements or experimenter's training, touchscreen tests prove to be an interesting research avenue for large-scale naturalistic studies. We are in the process of testing toddlers in 30 daycares in the Paris region (estimated number of about 300 children from a diverse socio-economic and linguistic background), as part of an RCT Language Intervention, where our touchscreen game will be used as a pre-post-test language measure, in addition to the CDI. This will allow us to assess further the sensitivity of the results to external factors such as exposure to French for children growing up in multilingual households and maternal education.

[PS-1.14]

Exploring a novel method for plotting families' activities during a daylong recording of children's naturalistic language input

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Background

In a recent review of how activity context affects parent-child interaction, we found that in many studies, the contexts and activities observed lacked ecological validity (Holme et al., 2021). Novel technologies like automated recording devices capture naturalistic interactions, yet audio alone cannot provide contextual detail about what was happening during the recording. A range of methods have been used to map families' activities during naturalistic language recordings, with advantages and disadvantages to each approach. For example, field notes require a researcher to be present, while parent diaries assume high levels of literacy (Soderstrom & Wittebolle, 2013). Here we will present a novel method for capturing contextual detail of audio recordings while incorporating parents' perspectives. Method Families with a typically developing child aged 2 ½ to 4 years were eligible for inclusion. Recruitment targeted variation in family size, structure, and cultural background (n=12). On a day of their choice, families made an audio recording of their interactions and took photographs of their activities. This was followed by an interview with the researcher incorporating the automated recording analysis and the photos. The output from each interview was a timeline of their day and parents' reflections on their interactions and activities. Results This presentation reports on the utility of using photographs and timelines to map family activities. Graphs from the recording showing high and low points of interaction were annotated with information about families' diverse activities. Photographs and quotations from the interviews showed variation in how activities were interpreted, and what parents perceived as important moments for interaction. Discussion We will reflect on the benefits of the method presented here, including the potential for gathering rich data, alongside challenges faced, such as how to accurately identify activities. Recommendations will be given for researchers who may want to use this approach in future.

[PS-1.15]

Lookit Plus: Infancy Research in the Time of Covid - and Beyond

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Lookit is a platform for online infant studies that was fast-tracked in response to COVID-19. Lookit was developed by and for infant researchers and is an appropriate platform for both individual and collaborative Many-Babies type projects (Sheskin, Scott, et al., 2020). Here we evaluate the pros and cons of Lookit in an adaptation of the Kabdebon and Dehaene-Lambertz (2019) EEG method for use with visual fixation, in order to test phonological abstraction in 3- to 7-month-old infants. In an Exposure phase infants learn two categories of nonwords, e.g., an artificial phonological inventory with 8-vowels/2-consonants (8V-2C) vs a 2V-8C category. The 8V-2C nonwords are paired with one visual cartoon, and 2V-8C instances with a different cartoon. In Test, category learning is evaluated by comparing fixations to Congruent (same as Exposure) and Incongruent (mismatching nonword-image) pairings. The coding required precise timing of events, and selection of nonwords from a nonword pool without replacement, and both were doable in Lookit. Further Lookit pros are that the pool of participants knows no geographical or temporal boundaries; the Lookit interface allows parents to provide demographic data just once, so the duration of any particular experiment is minimised; and parents can be contacted for reimbursements or longitudinal follow-ups. On the negative side, trial duration can vary slightly due to web fluctuations; the demographic data is stored centrally and must be married to the infant-experiment data contained within a detailed log file with timestamped events, and scoring must be done off-line from a time-synched video file. To address these issues we have written publicly-available scripts to: (i) transform the csv output into a more focused csv file, (ii) call up demographic information and pair it with the trial onset/offset and trial type data; and (iii) time fixations. These developments augment the other advantages of the Lookit platform.

[PS-1.16]

ManyBabies-AtHome Looking While Listening: Constructing an online, cross-linguistic investigation of word recognition

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ManyBabies is an international, collaborative project focusing on conceptual replication of key findings and best practices in developmental research (Frank et al., 2017). ManyBabies-AtHome is developing a remote testing framework that can be used across a range of home environments across many countries. This allows for inclusion of populations often excluded in lab-based studies, as well as testing infants in a familiar environment.

This project within ManyBabies-AtHome aims to study the developmental trajectory of word recognition in infants learning different languages, using an online version of the traditional Looking-While-Listening paradigm (LWL; e.g., Golinkoff et al., 1987; Fernald, et al., 2008). Although this paradigm has been used extensively across languages, comparisons of infants learning different languages within the same study are rare (e.g. Ramon-Casas et al., 2009). Furthermore, experimental design and analytic decisions vary considerably between studies (Von Holzen & Bergmann, 2021; Zettersten, et al., 2021), rendering comparison difficult or even making them impossible. However, creating a controlled multilingual and multi-cultural study with comparable linguistic stimuli that is at the same time suitable for young infants proves challenging: How can we ensure that a given set of stimuli do not bias results in favor of specific - and often the most studied - languages, how do we select stimuli that are appropriate cross-culturally, and how do we account for any resulting differences between infants learning different languages? We will discuss these challenges and the collaboratively developed solutions. Our approach has broad implications, as adaptation to the local context remains a challenge for multi-site replication projects, or, indeed, cross-linguistic and cross-cultural work more generally. We also anticipate that our stimulus development protocol and the challenges and solutions we face will be useful in multilingualism research, where investigators can then select the suitable languages from an existing item pool.

[PS-1.17]

Measuring interest in early childhood - a validation of various interest measures of young children

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Studies have shown that children can actively steer their learning progress, by pointing and vocalising to extract information they are interested in from conversation partners, and learning and retaining such information better (Mani & Ackermann, 2018). Children's interests in particular topics and objects have typically been indexed using measures such as children's touchscreen responses in active choice tasks, their attention to particular objects in looking time tasks, parental reports and more recently, physiological responses such as pupillary arousal (Ackermann et al., 2020; Kang et al., 2009; Partridge et al., 2015). The aim of the study is to examine the association between previously reported measures of children's interests, with regard to children's interest in natural object categories as indexed by (1) parents' estimation of children's category knowledge (2) children's physiological (pupil dilation), intrinsic and extrinsic (looking time toward objects, overt choices in a task) responses to objects from different categories (3) parent's estimation of their child's interest in the categories. We recruited 81 2-3-year-old monolingual German children. Children completed two tasks: (a) pupillometry and looking time task providing indices of their pupillary arousal and selective attention to objects from different categories; (b) sticker-choice task providing an index of their explicit choice of objects from different categories. In addition, we collected reports of parental estimates of children's interest and knowledge about different object categories. We predict that parental reports of children's interests will be closely associated with (1) parent's knowledge of children's category size and (2) children's pupillary arousal, looking time and overt choice data. Taken together, the study focuses on cross-validating a wide number of measures of interest in early childhood, integrating physiological, behavioural, and parental indices of interest in early development. Thereby, we aim to establish dependable methods to investigate how interest affects language development during childhood.

[PS-1.18]

Not the same category? Online and laboratory-based infant looking time data

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The novelty preference paradigm is a well-established measure in infant research and often used to examine the pattern of infants' visual object categorization. Here, infants are familiarized with objects from a single category and tested on their looking time to another object of the just-seen category vs. a super-novel object from a different category. Longer looking times to the super-novel object are interpreted as a novelty preference, based on infants' successfully incorporating the novel category member into the trained category. So far, such procedures were mainly conducted in highly controlled laboratory settings. However, during the Covid-19 pandemic, data collection was moved online to allow for continuation of ongoing research despite world-wide contact restrictions. Here, we used a web-based format (n=20) and a lab-based format (n=13) to familiarize 12-month-olds with novel objects from a single category, always accompanied by a single label (i.e., "Tanu"). In the web-based format, families participated online at home using a computer screen and a camera while the other group of infants was invited to the lab to participate in a controlled eye-tracking setup. Preliminary data showed that testing site (web vs. lab) explains differences in target (i.e., novel-category object) looking behavior at test ($\chi 2=16.58$, df=8, p=.035) and suggests that online studies may not sufficiently tap into infants' category formation. Such findings call for caution when planning and interpreting web-based infant looking time data as objects and events on a small screen may not elicit looking time patterns that are consistent with laboratory settings. The final sample will report differences in the extent to which looking time patterns observed in the lab vs. online influence infants' novelty preference in category formation tasks (N=80).

[PS-1.19]

Phase-locking of non-nutritive sucking to language stimuli: Understanding infants' synchronization to speech.

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Infants produce rhythmic mouth and jaw movements in the absence of receiving nutrition, a behavior that has been instrumental to the study of language discrimination and preference for language over the last 50 years. However, the trend for using a pressure transducer pacifier and the non-nutritive sucking (NNS) behavior in ways that inform the understanding of language development has been declining over the last decades. We would like to present a poster which highlights a way in which the pressure transducer pacifier could regain its status as a useful tool for studying language development in the first months of life. As language is characterized by rhythmic properties which infants can perceive, we developed and tested a script for analyzing the phase-locking between rhythmic language-related stimuli and the NNS of a test sample of infants (N=3). Our results imply that employing NNS is still highly relevant for the understanding of language development and acquisition in early infancy when few other methodologies are available. Infants at three months of age better align their produced behavior to the phase of the stimuli as compared to a silent baseline period and synchronize better to infant-directed (slower) over adult-directed (faster) syllable rates. We believe that these results might reflect a way for the infants to practice speech-related behavior prior to acquiring their native language, a hypothesis our methodology allows for testing in future studies.

[PS-1.20]

Relationships between different measures of language development in Czech children

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Mean length of the utterance (MLU) and Index of productive syntax (IPSyn) are well-established measures of language acquisition. Different types of MLU are suitable for different languages but so far no one has compared which one is suitable for Czech. Likewise, IPSyn has not yet been adapted to many Slavic languages. We therefore compared MLU in syllables, morphemes, and words and we adapted IPSyn to the needs of Czech. We then examined the use of these measures and relations between them and other language tests for child language transcripts in Czech. We used a corpus of 110 children recorded during free play at two time points: 2;6 years and then at 3;8 (60 children) and 4;4 years (50 children). The children were also tested for receptive vocabulary and grammar.

The different MLU measures correlated closely (all r's > 0,97), so we used MLU in words in further analyses. We found strong correlations between transcript-based measures of MLU and IPSyn in both time points (0.88 and 0.77). Both MLU and IPSyn in 2;6 years predict themselves in 3;8 and 4;4 years (β = 0.37 and 0.35 respectively). In the case of IPSyn, the vocabulary test showed a unique effect above and beyond the factors of other predictors (β = 0.26), in the case of MLU, it was at the limit of significance. Our results confirm that MLU in words is an adequate measure. This is an important finding as an automatic calculation of MLU in morphemes or syllables in highly inflectional languages such as Czech is complicated. IPSyn seems to be a valid measure since it predicts itself in time with a vocabulary measure as a unique predictor and it also correlates closely with a transcript-based measure such as MLU.

[PS-1.21]

A pre-registered systematic review of methods used for detecting MMNs for categorical perception of sounds, with particular attention to speech sounds in infant

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In studies of early language development, few methods provide insights into the development of pre-verbal infants' hearing. Mismatch Negativity (MMN) is an unattended neural marker of auditory change detection measured in EEG, making it useful for studies of pre-verbal linguistic development (Näätänen, 1999; Friedrich et al., 2004; Garcia-Sierra et al., 2016).

However, one recent systematic review of the N400 literature (Šoškić et al., 2021) showed large variability in how event related potentials (ERPs) are recorded, processed, and analysed, resulting in a high degree of experimenter freedom (a large garden of forking paths). To help future researchers refine their analytical targets, we pre-registered a systematic review of MMN literature with a focus on early childhood data sets, to establish which processing and analysis pathways have the most evidence in the literature (https://osf.io/p9jy3). We focused on peer-reviewed reports of MMN studies, published between 1974 to 2019, with the auditory oddball paradigm using speech-like stimuli in neurotypical one to 3-year-olds. Following the pre-registered search parameters, 12,911 papers were screened for inclusion in the full review, 1107 fulfilled our search criteria but did not include children below 3. The full search resulted in a sample of 43 papers, currently being catalogued for qualitative synthesis. The pre-registered data under investigation are over 350 items, including sample size, percentage of standard and deviant stimuli, trial number, duration of exposure, deviant predictableness, nature of stimuli contrast, nativeness of stimuli, recording hardware and software, processing filter, length of epoch, electrode selection, statistic strategy etc. At the time of submission over 90% of the data items have been documented. The results of the systematic review will provide valuable data for making evidence-based analysis decisions prior to data availability, potentially enabling pre-registered study protocols.

[PS-1.22]

Acoustic sensitivity to vowels and fricatives during the first year of life and its relationship with later lexical development

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Recent research demonstrated detailed developmental changes in the sensitivity to the acoustic cues of vowels, using the Acoustic Change Complex (ACC) within EEG (McCarthy et al., 2019). In the current study, we expand this work to fricative perception, with the aim to investigate how changes in acoustic sensitivity might be driving the developmental trajectory of vowels being acquired earlier than higher frequency consonant sounds such as fricatives (e.g., Nespor, Pena & Mehler, 2003). A secondary aim was to investigate the relationship between this early auditory processing and later lexical development.

Eighty monolingual English infants (4-5, 7-8 and 10-11 months-old) took part in the study. Vowel and fricative sensitivity was assessed using the ACC within EEG, which for infants typically evokes a positivity about 150-200ms after a spectral change. The ACC was measured for three vowel pairs and three fricative pairs, that were presented in runs of five per pair before switching to a new random pair. Each infant was tested for an average of 18 minutes, resulting in around 250 trials per pair. ERPs were averaged across epochs for each pair, with the magnitude of the response for each pair being used as a comparison measure. In addition, lexical development was assessed at 16, 20, and 24-months using the CDI. Results show developmental differences for vowel and fricative perception. Infants initially show a greater sensitivity to the vowel contrasts, with fricative sensitivity increasing with age. Preliminary analyses suggest fine-grained differences in fricative development, with young infants displaying a higher sensitivity to low frequency aspects e.g., /s/-/z/. We plan to explore which spectral features are driving the infants' perceptual sensitivity. Initial analyses of the CDI data suggest that infants' ACC magnitude predicts later lexical development. These findings provide a detailed picture of early perceptual development and its relationship early lexical development.

[PS-1.**23]**

Acquisition of novel lexical items: an event-related potential study in French-learning 2-year-olds

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Exposure to novel pseudowords has shown to enhance an early negative event-related potential (ERP) while no enhancement was observed for known words or nonwords in adult participants (Shtyrov, 2011; Kimppa et al., 2015). The enhancement occurring around 50 ms after word disambiguation point was correlated with behavioral outcomes, suggesting that it represents a neural marker for lexical learning (Kimppa et al., 2015). Similar modulation was observed also in school-aged children but it occurred with a lesser amount of exposure, suggesting a higher neural plasticity of the developing brain (Partanen et al., 2017). Here, we measured ERP in response to known words and pseudowords in 24 month old French learning toddlers. The participants were presented with known words (e.g., bateau, a boat) and pseudowords (e.g., bamon). The word disambiguation point was set at the onset of the second syllable. The aim was to investigate whether a similar neural enhancement occurs during early language acquisition, and whether concurrent vocabulary skills affect the response magnitudes. We expected toddlers with higher vocabulary skills to exhibit a greater neural enhancement in response to novel words during repetitive exposure. The results showed that the magnitude of negativity was similar for words and pseudowords at the early exposure phase, whereas at the late exposure phase, the amplitudes became larger for pseudowords resulting in a significant difference in the amplitudes between known words and pseudowords. The amplitudes for known words were not changed during the task. The enhancement was observed at 400 ms to 600 ms after word disambiguation. The magnitude of enhancement was not affected by individual vocabulary skills. It is suggested that the enhancement may be linked to increased effort in integrating novel words into existing lexicon.

[PS-1.24]

Amplitude modulation following response in 3-month-old infants: is there a link with the ability to perceive speech in noise?

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Temporal modulations play a fundamental role in speech perception. The capacity to detect amplitude modulations (AM), that correspond to slow fluctuations in sound amplitude over time, is usually estimated behaviourally by measuring the sensitivity to AM depth as a function of modulation rate. Using electroencephalography (EEG), an auditory potential reflecting the brain activity following the modulation frequency of amplitude modulated tones can be recorded at the scalp level. This response is known as the AM following response (AMFR). We explored AMFR development and its relationship with phonological development. French-learning 3-month-olds completed:

1) An EEG session measuring AMFR at two AM rates (the sounds were either presented at a level of 65 dB SPL, n =15 or 75 dB SPL, n =15). The stimuli are a 4-min long pure tone carrier at 1027 Hz sinusoidally modulated at either 8 Hz or 40 Hz at 100%. Sounds are played through loudspeakers. Three active central electrodes are fitted on a cap (Fz, Cz, Pz). 2) A behavioural measure of vowel-detection in noise (observer-based procedure) implemented to assess detection of a change in vowel category (/ba, da, ga/ vs /bi, di, gi/). Non-target syllables were played as background sounds in a speech-shaped noise (signal to noise ratio = -5dB). The number of trials required to reach 80%-correct criterion was measured for each participant. 3) The vocal reactivity scale of the Infant Behavior Questionnaire. Preliminary analyses show that both groups display an AMFR at 8 Hz but not at 40 Hz modulation. Increasing the presentation level increased the magnitude of AMFR at 8 Hz only. Correlation analyses assessing the relationship between AMFR, vowel detection in noise and vocal reactivity are still ongoing. The extraction of the AMFR magnitude value needs to be improved to obtain noise-free individual estimates.

[PS-1.25]

An electrophysiological study on stress discrimination by European Portuguese-learning infants

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Perception of word stress is essential to language acquisition, as it may facilitate infants' word recognition and predict infants' later language abilities. Previous studies have demonstrated that infants, regardless of their native language, can discriminate basic word stress patterns from birth, as long as the stimuli have limited segmental variation. Moreover, some eye-tracking and event-related potentials (ERPs) studies have suggested that language-specific development of stress acquisition may emerge between 4 and 6 month of age, which was manifested by infants' preference for one of the stress patterns (i.e. trochee or iamb). This asymmetrical perception of stress patterns has been attributed to the rhythmic properties of infants' native language (i.e., stress-timed or syllable-timed) and/or the language-specific frequency distribution of stress patterns. European Portuguese (EP) is a language with a mixed prosodic profile and conflicting frequency distributions of stress patterns. Besides, vowel reduction and duration, instead of pitch, have been claimed as the primary cues for stress perception in EP. Previous ERPs and behavioral studies have revealed diverging results regarding EP adult speakers' stress discrimination in the absence of vowel quality cues: they were able to perceive the stress contrasts at the pre-attentive stage, whereas exhibited a stress "deafness" effect similar to that found in speakers of languages with fixed stress at the attentive stage. Nonetheless, both measures on EP adults have demonstrated a processing advantage for the iambic stress pattern, which was replicated by an eye-tracking study on EP-learning infants at 5-6 months. Using a passive oddball paradigm, the present study further examines how EP-learning infants at 5-6 months pre-attentively process stress contrasts without vowel quality cues. Preliminary data from 18 infants showed that a significant mismatch response was elicited by both trochaic and iambic stress patterns. Further analysis will investigate whether EP-learning infants ERP responses exhibit asymmetrical perception/stress preference.

[PS-1.26]

Artificial language segmentation in 6-to-7 month-old German-learning infants

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Research has suggested that infants can use distributional statistical cues like transitional probabilities (TPs) between syllables to extract words from fluent speech from 5 months of age (English: Thiessen & Erickson, 2013; French: Mersad & Nazzi, 2012; Dutch: Johnson & Tyler, 2010). German-learning infants at around 7 and 9 months of age (Marimon et al., 2021) rely more strongly on prosodic cues compared to TPs to segment a speech stream when cues indicate different word boundaries. The goal of the present study was to investigate whether German-learning infants can segment words from an artificial learning string containing only TPs.

We familiarized 6-to-7-month-old German-learning infants (n= 31) with the MBROLA synthesized version of the speech stream used in Marimon et al. (2021). The stream contained 4 disyllabic words and had a duration of 2 min. The TPs between syllables within words were 1.0, whereas the TPs across words ranged between 0.4 and 0.2. Testing included three conditions: words (high TPs), part-words (low TPs) and non-words (items with syllables that never co-occurred in the string, TPs were 0.0). Infants would segment the words from the string correctly if they relied on the TPs. We employed Linear Mixed Effects Models (LT~ Condition + Age + Trial Nr + Version + Gender + (1| participant) + (1|item)) in which the non-word condition was compared to the other conditions. Since Age was significant in this model, we explored Age as an interaction with Condition. The model output indicated longer looking times for non-words (novelty effect) compared to words and part-words as infants grow older ($p = .04$). We suggest that infants show some memory of chunks from the familiarization string but they might not infer boundaries using TPs. This finding underlines early impacts of language specific structural properties on segmentation mechanisms and their development.

[PS-1.27]

Brain Myelination at 7 Months of Age Predicts Language Production During Early Childhood

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Behavioral and function brain studies have demonstrated a dramatic increase in language processing ability in the second half of the first year of life, including in the areas of phonological processing, word segmentation, and pattern recognition. These changes have been linked to language development later in childhood. The structural brain mechanisms that underlie the changes during this period and links to later behavior are unknown. The objective of this study was to examine how brain myelination during this period relate to later language development. Using MRI, whole-brain myelin maps were generated for 27 seven-month-old infants and 26 eleven-month-old using macromolecular proton fraction mapping. The MacArthur Bates Communicative Development Inventories was used to longitudinally measure the number of words produced as well as mean length of utterance of the same children at 12, 18, 24 and 30 months of age. Voxel-based correlations between myelin density in the brain at 7 and 11 months and these two language measures were calculated. Myelin density at 7 months of age in parietal and temporal regions was found to be predictive of words produced at 24 months of age, and of mean length of utterance at 30 months of age. A complementary growth curve analysis revealed that average brain myelin density at 7 months in these brain regions was predictive of growth in both of these language measures up to 30 months of age. No relationships were found between myelin density at 11 months and language measures, nor between changes in myelin density between 7 and 11 months and language measures. These findings suggest that changes in brain myelin density precede periods of marked change in language development during early childhood.

[PS-1.28]

Brain Myelin Density at 7 Months of Age Predicts Neural Sensitivity to Speech Contrasts at 11 Months of Age

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Between 7 and 11 months of age, infants demonstrate dramatic changes in phonological processing abilities, and learning during this period has been shown to predict later language development. During this learning period, the ability to discriminate between nonnative contrasts decreases, and the ability to discriminate between native contrasts increases. These developmental changes have been shown using both behavioral and neural methods. The brain structural mechanisms that underlie these behavioral and neural changes are unknown. The aim of this study was to investigate relationships between discrimination of native and nonnative speech contrasts at 7 and 11 months of age, as measured with magnetoencephalography (MEG), and myelination of language tracts in the brains of the same children at the same ages. In this dataset, 23 infants have both MEG and MRI results. Using MEG, mismatch responses (MMR) for both native and nonnative speech contrasts were measured in a single double-oddball paradigm. MMRs were further reduced to 4 regions-of-interest (ROIs): left/right hemisphere superior temporal gyri and inferior frontal gyri. Using MRI, myelin maps at 7 and 11 months were generated using macromolecular proton fraction mapping. Concurrent voxel-based correlations between myelin density in white matter language tracts in the brain and MMRs in ROIs for both native and nonnative speech sounds were calculated at 7 months and 11 months. These calculations were repeated for myelin volumes at 7 months and MMR responses at 11 months. Significant correlations ($p<0.025$, one-tailed) were found between myelin volumes at 7 months and MMR magnitudes in the left superior temporal lobe at 11 months. These correlations were located in the left hemisphere only, in voxels of the superior longitudinal, inferior fronto-occipital, and inferior longitudinal fasciculi. These findings suggest that brain myelination in left hemisphere regions plays a significant role in phonetic learning during the sensitive period for phonological processing.

[PS-1.29]

Cortical tracking of auditory rhythm across the first year: An EEG study

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Infant-directed speech contains enhanced power in low frequency amplitude modulations (Leong et al., 2017), which may provide infants with important information concerning the temporal structure of speech. Indeed, children with dyslexia exhibit atypical neural tracking of slow modulations in speech, related to impaired phonological development (Power et al., 2016). Thus, individual differences in tracking low frequency rhythmic auditory stimuli in infancy may have implications for the acquisition of language.

Cortical tracking of a repeated syllable, presented at 2Hz, has been linked to performance on standardised reading and phonological measures (Power et al., 2013). As part of the longitudinal "BabyRhythm" study of 122 infants, we presented babies with similar rhythmic auditory stimuli (repeated syllable, drumbeat, 2Hz rate) at the ages of eight weeks, six months, and nine months. Time-frequency analysis of EEG data was used to examine how accurately the infant brain tracked these stimuli. As expected, 2Hz EEG power increased during auditory stimulation, $F(4, 2421) = 33.38$, $p < 0.0001$. EEG power increased further with age, $F(8, 2421) = 7.17$, $p < 0.0001$. Further, 2Hz phase coherence was significant across trials, $F(4, 3361) = 35.57$, $p < 0.0001$, indicating that the neural response was time-locked to the auditory stimuli. Developmental changes in rhythmic tracking at 2Hz were observed with age. At eight weeks, there was no group-level consistency in the infants' preferred oscillatory phase angle relative to the stimulus. By six months the preferred phase angle was consistent, and by nine months it grew more tightly aligned to the stimulus rate, $F(2, 343) = 5.03$, $p = 0.007$. These results suggest that cortical tracking develops early in life, and improves in accuracy with age. The next step is to examine relations between individual differences in infant cortical tracking and early language ability.

[PS-1.30]

Disentangling the factors that influence polarity in infant MMR - A critical review

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The mismatch response (MMR) in electroencephalographic recordings is a powerful measure to assess perceptual discrimination, especially in infants, as it does not require overt attention. In infants, the MMR can have both positive polarity (pMMR) and negative polarity (nMMR). Age has been proposed as the main factor driving this difference, because the pMMR changes towards an adult-like nMMR with increasing age. However, there is growing evidence that age influences the MMR polarity in interaction with other factors, such as stimulus characteristics (Cheng et al., 2013, DevNeuropsychol 38(5)). In the current review, we systematically assess which factors influence the polarity of the MMR. We performed two google-scholar searches: (i) “infant MMR mismatch response” and (ii) “infant MMN mismatch response”, and a backwards search of Yan et al. (2019, EarHear 40(6)) and Csibra et al. (2008, in Handbook of Developmental Cognitive Neuroscience, pp. 247-262). We included studies assessing the discrimination of simple tones, phonemes, syllables, or tone contrasts in 0- to 24-month-old typically developing monolingual infants. We found the following factors to influence MMR polarity: (1) Age; (2) Sleep state: quiet or active sleep or being awake; (3) Salience of the contrast; (4) Nativeness of the contrast; (5) Duration of inter-stimulus interval; (6) Data preprocessing methods; (7) Analysis time window; (8) Difference wave computation: subtracting physically identical or different stimuli (an exhaustive list of studies evaluating these factors will be presented at the conference). Our preliminary data suggest that although there is evidence for an age effect, this can only be interpreted in a meaningful way in its interaction with other factors. This is the more important, as opposite polarities cancel each other out, potentially resulting in null-findings. We expect our review to help improve study design and data interpretation in the widespread application of the MMR in developmental studies.

[PS-1.31]

Infants show enhanced neural response to musical meter frequencies

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When we listen to music, we spontaneously perceive and synchronize movement to periodic pulses of meter. There is increasing evidence that this cross-cultural ability relates to neural processes that selectively enhance metric periodicities, beyond stimulus properties and low-level nonlinear responses to acoustic inputs. However, whether these neural processes are innate or emerge later over the lifespan along with the development of sensorimotor synchronization abilities remains largely unknown. Here, we recorded the electroencephalogram (EEG) in fifteen healthy 5- to 6-month-old infants, i.e. before the acquisition of sensorimotor synchronization abilities, while they were exposed to two rhythms known to induce perception of meter consistent across adults. One rhythm contained prominent acoustic energy at periodicities corresponding to the meter whereas the other rhythm did not, thus providing control for trivial low-level confounds. Infants showed significantly enhanced metric periodicities in their EEG responses to both rhythms, irrespective of the prominence of these periodicities in the stimuli. This enhancement could not be fully explained by unspecific effects such as low-pass function or early auditory nonlinearities. These findings thus indicate that fundamental neural processes involved in the transformation of rhythmic inputs towards higher-level meter categories develop early after birth, before the ability for sensorimotor synchronization is acquired. At this age, the brain not only tracks prominent periodicities in stimulus modulations, but also selectively enhances these periodicities beyond low-level acoustic properties – a critical ability supporting human coordination during musical behaviors. Further, these observations may have the potential to contribute to our understanding of rhythm processing across domains, and open up new avenues for studying links between language and music development.

[PS-1.32]

Nonadjacent dependency learning in French-learning 27-month-old toddlers

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Over the last thirty years, research has underlined the importance of statistical learning, the ability to detect patterns and regularities in the environment, for language development (Saffran, 2020). Yet, there are few studies with French-speaking children, especially in artificial languages and using eye-tracking procedures.

Here, we investigate the learning of nonadjacent dependencies in 27-month-olds monolingual French-learning children (n=31) in Switzerland. Adapting Gómez (2002) to French and to a central fixation eye-tracking paradigm, participants were familiarized with an artificial language composed of three-element utterances (e.g. /ko lisɛb tuv/, /na sɔlmig fib/) with the structures [aXc] and [bXd], where the first and third elements were fixed monosyllables, and the middle element varied (one of 24 disyllables) We then monitored looking times for grammatical versus ungrammatical utterances over two test blocks of four trials each . Block order and languages (combinations of first and third elements) were counterbalanced across four groups. Figure 1 shows mean looking times by grammaticality and by block. Data were not normally distributed, requiring non-parametric tests. A Scheirer-Ray-Hare test showed a significant effect of block [$H(1) = 4.63$, $p = .031$] and a significant interaction between block and grammaticality [$H(1) = 4.12$, $p = .042$]. A post-hoc Dunn's test showed a preference for grammatical over ungrammatical trials in block 2 only ($p = .038$ uncorrected, $p = .075$ with Benjamin-Hochberg correction). Thus, we do not find the novelty effect expected from the literature, but rather an overall ceiling effect in the first block, probably because of the more engaging visual stimuli used here, and a familiarity effect in the second block. This suggests that our French-learning toddlers can learn nonadjacent dependencies, albeit not as easily as their English-learning peers with Gomez's (2002) methodology. We are currently analyzing potential relations with participants' developmental data (parental communicative and general development inventories).

[PS-1.33]

Representing prosodic cues in the 6-month- old infants' brain

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Infants can discriminate their native language from another language of the same rhythmic class (Nazzi et al., 2000), using cues like vowel distributions and intonational cues (Zacharaki & Sebastian-Galles, 2021). To understand how these cues are represented in the infant brain, we are reanalyzing the data from Peña et al. (2010). In this study, 6-month-old infants showed higher gamma power for sentences from Spanish (their native language) than Italian and Japanese, associated with phoneme processing (Peña et al., 2010). We aim to extend on these data on two levels: 1) we are analyzing infants' tracking of forward and reverse sentences from these languages. Forward speech contains prosodic cues (unlike reverse speech), particularly the intonation and syllabic rhythm. Syllabic rhythm of the sentences is the same for Spanish and Italian (syllable-timed), but not for Japanese (mora-timed). We filtered speech envelopes below 10 Hz, capturing the prosodic cues in speech. 2) We are using backward modeling of the speech envelope using multivariate temporal response functions (mTRF), in order to reconstruct the speech envelope using the EEG signal (Crosse et al., 2016). We hypothesized that a) if the EEG of 6-month-olds readily represents the intonational cues and the syllabic rhythm, the correlation between the original and reconstructed speech envelopes will be higher for forward Spanish sentences than Italian and Japanese. b) If the EEG of 6-month-olds represents only the syllabic rhythm, the correlations will be higher for forward Spanish and Italian sentences than Japanese. c) We do not expect any differences in correlations across languages for reverse sentences. d) We expect higher correlations in the forward sentences than reverse sentences. We test mTRF model with the epochs from one condition belonging to one participant, after training it on the epochs from the same condition belonging to the rest of the participants.

[PS-1.34]

Why do young children undress oranges? The neural signatures of unconventional verb extensions.

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Previous studies have suggested that verb overextensions based on abstract similarity (e.g., "She is undressing the orange", instead of peeling) denote young children's emerging ability to apply words by analogy (Bowerman, 1978; Duvignau et al., 2010; Hofstadter & Sander, 2013). However, other research has suggested that preschoolers tend to overextend verbs on the basis of more superficial similarities at the level of the type of objects to which the verb generally applies (Saji et al., 2011).

In the current study, we used the ERPs technique to assess 4-year-olds' ability to apply words by analogy. We hypothesized that the N400 elicited by verb overextensions would be smaller when they are based on abstract similarities rather than superficial similarities. Participants were presented with images of actions (e.g., peeling an orange) while hearing sentences containing a conventional verb (e.g., peeling), a pseudoverb (e.g., rauging) or an unconventional verb extension that could be either based on abstract relations (i.e., an approximate verb, e.g., undressing) or objects (i.e., superficially related verb, e.g., pressing). Results showed that the N400 was gradually decreasing from conventional verbs, approximate verbs, superficially related verbs to pseudoverbs. The findings demonstrate that unconventional extensions based on abstract relations are more readily processed than those based on objects. They raise the question of the factors promoting verb overextensions. We will also present the preliminary results of an ongoing study investigating whether the breadth of the verbs (defined as the number of objects' categories to which they conventionally apply, Bowerman, 2005) and children's lexical knowledge affect the N400 elicited by verb overextensions. Together, these studies shed light on the emerging ability to apply words by analogy, and suggest that the premises of metaphors comprehension are already in place from an early age.

[PS-1.35]

Caregiver responsivity, acceptance, and school readiness cognitive components in a Uruguayan sample

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This study explores caregivers´ responsivity and acceptance in a Uruguayan sample, and the relationship with school readiness cognitive components assessed in their children. Initially, 2354 households were assessed through Infant/Toddler (IT) HOME, including warmth (e. g. caregiver praises the child, initiates verbal exchanges, responds to child's vocalizations) and punishment avoidance observation, as well as sociodemographic characteristics of the caregiver. A subsample of children was assessed concurrently and one year later by their teachers in the educational context. Responsivity and acceptance were found to be sensitive to caregiver's and child's age, and the educational level of the home referent. Caregiver´s acceptance was also sensitive to child´s sex. The associations between these home environment variables and children´s language, logic-mathematical skills, self-projection, and executive functioning as cognitive school readiness markers will be discussed.

[PS-1.36]

Sustained Pacifier Use is Associated with Smaller Vocabulary Sizes at 1 and 2 Years of Age.

Luis Munoz [1], Natalia Kartushina [1] & Julien Mayor [1]

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Pacifier use during childhood has been hypothesised to interfere with language processing. Recent evidence suggests that transient use of an object in the infant's mouth impairs speech sound discrimination and that extensive pacifier use translates into slower processing of abstract words, but to date no studies have revealed detrimental effects of prolonged pacifier use on infant vocabulary learning. The present pre-registered study tests the hypothesis that greater accumulated pacifier use is associated with smaller vocabulary sizes at 12- (in comprehension and production) and 24-months of age (in production).

Parents from Oslo filled in Norwegian CDIs, parental reports that assess receptive and expressive vocabulary for 12-month-old infants and expressive vocabulary for 24-month-old infants. We transformed CDI scores into age- and gender-based percentiles using Norwegian norms. Additionally, parents reported their infant's daytime pacifier use, in hours, in 2-month intervals from birth to the assessment date. Our final sample consists of (n=448) 12- and (n=733) 24-month-old monolingual infants. Beta regressions on vocabulary percentiles, controlling for maternal education, revealed that accumulated pacifier use (in hours since birth) correlated negatively with 12-month-olds' vocabulary sizes in both comprehension (z=-2.13, SE=.05, p=.03) and production (z=-2.48, SE=0.04, p=.01), and with 24-month-olds' production (z=-1.99, SE=0.04, p=.046). Follow-up models revealed that infants with increasing pacifier use over age had lower vocabulary sizes at the assessment date than those with declining pacifier use, while accumulated pacifier use remained significant for both production (p's<.001) and comprehension (p=.04). Our analyses, revealing that accumulated pacifier use correlate negatively with vocabulary sizes at 12- and 24-months of age, and that later pacifier use correlate more strongly (negatively) with vocabulary size than precocious use, extend findings of momentary effects of experimentally induced "impairment" in articulator movement on speech perception and suggest that prolonged constrains on the infant's speech articulators (pacifier use) may negatively impact language acquisition.

[PS-1.37]

Verb learning in Japanese and English: Do Comparisons Help?

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Learning verbs is an important part of learning one's native language. Prior studies have shown that children younger than five years can have difficulty learning and extending new verbs (Imai et al., 2005; 2008). Two new studies include similar stimuli to these prior studies, but add additional comparison trials, and an additional test trial type, and show improved verb learning. In Study 1, 2½-, 3½- and 4½-year-old Japanese-speaking (n=180) children learned four novel verbs in a progressive alignment (events with similar objects shown before events with differing objects) or an all varied condition (events with differing objects). After watching events, children saw two test trials; in each children pointed to one of two scenes to extend the verb. One test trial was predicted to be more difficult as a familiar object needed to be ignored; other trial had all new objects. A univariate ANOVA shows main effects of Age, Condition, and an Age x Condition interaction (ps< .05). Three ½-year-old Japanese-speaking children performed better in the progressive alignment condition than the all varied condition, suggesting experience seeing similar events was useful for verb learning. In Study 2, the same aged English-speaking children (n=63 to date) shown the same stimuli did not differ by condition, but were more successful in the new test trial type including new objects (p=.01). This suggests that children can extend verbs if the objects in the test trial are not distracting to them. English-speaking children in each age group were able to extend the verbs (ps< .02). Overall, results in both languages show children benefit from seeing events they can compare; Japanese children's results also show similarity across events (progressive alignment) can be important in facilitating verb learning. Thus, these studies show an important mechanism for verb learning- comparison of events- may be useful across languages.

[PS-1.38]

Relating referential clarity and auditory clarity in infant-directed speech

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For infants learning language, the referential world is demonstrably ambiguous. Even native-speaker adults usually cannot guess what a parent is referring to, without hearing the audio (e.g., Trueswell et al., 2016; the "Human Simulation Paradigm"). However, there are special moments, "gems," in which words' referents are clear in context. Similarly, spoken language is ambiguous, phonetically variable, and frequently uninterpretable out of context (e.g., Bard & Anderson, 1983); but there are some instances of words that are especially clear, hyperarticulated, or otherwise emphasized (e.g., Cychosz et al., 2021). Here, we introduce the question of whether these especially clear referential instances and phonetic instances are, in fact, the same ones: word-learning gems in a sea of referential and phonetic ambiguity.

We analyzed a corpus of 40-second video clips of parents speaking to their children at home (14-18 months; Cartmill et al., 2013). In each clip, parents produced a common concrete noun. The proportion of observers who correctly guessed this target word from the visual information alone, with the audio muted, provides a measure of referential clarity (HSP accuracy). We extracted the target-words' audio from 168 of these videos, and asked listeners to identify the word and rate its clarity. We then computed the normalized Levenshtein distance (how many phones listeners' guesses were from correct) and average clarity rating for each instance of the word. Mixed-effects logistic regression models found that higher auditory clarity of the first instance in each video significantly predicted higher HSP accuracy. Thus, when parents' speech was especially clear, the referential semantics were also clearer. This effect was short-lived (it did not extend to later mentions) but significant using both Levenshtein distance and clarity ratings. Overall, this work suggests that there are rare moments of special clarity that could help children overcome the widespread ambiguity in their language environments.

[PS-1.39]

The role of talker identity on semantic representations of newly learned words

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We investigate whether speaker identity influences the semantic relations between newly learned words. Previous work has suggested that toddler's word representations of newly learned words include knowledge about the visual similarity of the referents (Wojcik & Saffran, 2013). In this task, rather than manipulating the visual similarity of the referents, we trained them on words taught by two different speakers who were visible during labelling.

Method: 22–30-month-old toddlers' semantic learning was assessed using a preferential looking paradigm on the online experiment platform Labvanced. Familiarization: toddlers saw 16 familiarization trials, in which they learned four novel word-object pairs. Two words were taught by a speaker of a familiar race (e.g., mito and dax) and two words were taught by a speaker of an unfamiliar race (e.g., teppu and nim). Test: participants viewed a minimum of 12 20-second audio-only test trials. There were two types of test trials, Within-Speaker trials, including familiar race speaker trials (mito/dax) and unfamiliar race speaker trials(tepu/nim), and Between-Speaker trials (tepu/dax). Prior to beginning the study parents self-selected the combination of speakers they saw based on their child's daily experiences (options included a Black, White, and East Asian speaker). Results: If toddlers interpret words taught by the same speaker to be more related than words taught by different speakers, they should attend longer to Within-Speaker trials than Between-Speaker trials (Wojcik & Saffran, 2013). A preliminary paired sample t-test (N=18) comparing Within-Speaker vs. Between-Speaker trials suggested that there may be an effect of trial type, $p = .054$, conf. int = -0.0299, 2.33, $d = .485$. These preliminary results suggest that a speaker identity is used by toddlers to guide their semantic learning, adding to a growing body of research suggesting that talker-specific and group-level knowledge is integrated into word representations (e.g., Weatherhead & White, 2021).

[PS-1.40]

Cortical Tracking of Infant- and Adult-Directed Speech in the First Year of Life

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Infant-directed speech (IDS) refers to the speech register that adults use in interactions with young infants. Compared to adult-directed speech (ADS), IDS is characterized by slower rate, higher pitch and larger pitch range, and acoustically exaggerated speech sounds. Importantly, IDS is not simply a playful and comforting manner of speaking to infants, but it has been proposed to play a central role in facilitating early linguistic development.

Recent research has proposed that IDS may foster early language processing and subsequent language acquisition by facilitating the process of cortical tracking in the first months of life. Cortical tracking refers to the process by which cortical activity tracks dynamic patterns of incoming information, in this case speech input. Kalashnikova et al. (2018) measured cortical tracking in 7-month-old infants when they listened to naturally-produced IDS and ADS, and found evidence for tracking only in the IDS and not the ADS condition. Here, we examine the effect of infants' age and developing linguistic experience on cortical tracking of IDS and ADS. Furthermore, we test the generalisability of previous findings by assessing cortical tracking of a syllable-timed language. For this purpose, monolingual infants acquiring Basque (N=20) participated in a longitudinal study at 4 and 9 months of age. Infants' continuous neural responses were measured using EEG while they listened to a recording of a female speaker reading children's stories in IDS and ADS. The amplitude envelope of the speech stimuli and the corresponding EEG signal from each child were extracted to compute a neural entrainment index for IDS and ADS focusing on the theta (3-8Hz) and delta (1-3Hz) bands of neural oscillations. Preliminary results of this longitudinal study will be discussed in relation to the proposed effects of IDS prosody in facilitating speech encoding during infants' first year of life.

[PS-2.1]

Are vocabulary outcomes in children with cochlear implants affected by music exposure and maternal musicality?

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Children with cochlear implants (CIs) display great variability in their vocabulary outcomes (Majorano et al., 2018), despite early implantation (Boons et al., 2013). Early vocabulary building abilities may be affected by individual differences in music exposure and engagement and in parent musicality, as these factors were found to be associated with language skills in children with typical and atypical development (Ladányi et al., 2020; Nayak et al., 2021; Torppa & Huotilainen, 2019). This study investigates this hypothesis by testing 16 Italian cochlear-implanted children with severe to profound hearing loss before implantation (mean age=16 months, SD=7.7, range=9-32) and three, six, and twelve months after implantation. Children's vocabulary knowledge was investigated using the MacArthur-Bates-Communication Development Inventory (MB-CDI) and video-recordings of mother-child interactions at each session. Children's music exposure was recorded continuously over the first year after implantation by the children's devices and analyzed using data logs. Music exposure and maternal musicality were investigated using additional self-report questionnaires (Müllensiefen et al., 2014; Politimou et al., 2019). Preliminary analyses on the MB-CDI scores with maternal education as covariate showed that mothers' musicality predicted the expressive vocabulary that children achieved three months after implantation. Linear regressions on children's receptive vocabulary at three months after implantation showed a significant effect of the average daily exposure received to music in the first three months after implantation. In both cases, adding the additional musical variables in the models on children's vocabulary significantly improved the proportion of variance explained. These results suggest that inherited musical abilities from mothers and music exposure and engagement in the first few months after implantation are important factors affecting expressive and receptive vocabulary acquisition in infants and toddlers with CIs. These findings support the idea that music activities enhance language development in children with CIs, with important implications for music programs, clinicians, and families.

[PS-2.2]

Cognitive predictors of language abilities in primary school children: A cascaded developmental view

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This study investigated the longitudinal relationship between children's domain-general cognitive constraints underlying phonological and sentence processing development in a big sample of typically developing children. 104 children were tested on non-linguistic processing speed, phonological skills (phonological short term memory, phonological knowledge, phonological working memory), and sentence processing abilities (sentence repetition and receptive grammar) in 1st grade (aged 6 to 6.5) and one year later. A cross-lagged structural equation model showed that non-linguistic processing speed was a concurrent predictor of phonological skills, and that phonology had a powerful effect on the child´s sentence processing abilities concurrently and longitudinally, providing clear evidence for the role of domain-general processes in the developmental pathway of language. These findings support a cascaded cognitive view of language development and pose important challenges for evaluation and intervention strategies in childhood.

[PS-2.3]

Infants Born At Risk vs Not At Risk for Dyslexia: Effects on Later Auditory-Visual Processing

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Two findings motivate this study. First, the McGurk Effect occurs in English-language adults and intensifies between 6 and 8 years along with heightened language skills in English-language but not Japanese-language children (Sekiyama & Burnham, 2008; Erdener & Burnham, 2013). This could imply that the McGurk Effect is a product of learning to read a particular language, but even 4.5-month-old infants perceive the McGurk Effect (Burnham& Dodd, 2004). Second, infants at risk (AR) versus not at risk (NAR) for dyslexia have a discrimination deficit for auditory rise-time stimuli, and this is related to language-learning phenomena Kalashikova et al., 2018). Thus, the question arises: does being AR entail an auditory-visual speech processing deficit and is this associated with language ability? We are investigating language development in AR and NAR children from 5 months to 5 years of age. We previously showed that AR compared to NAR infants have impaired auditory processing at 10 months. Here, we report a follow-up assessment of 22 AR and 24 NAR children's auditory-visual perception and phonological awareness at 4;6 years. NAR children showed more Auditory-Only correct responses than AR children. AR children showed a greater increase in auditorally-correct responses than did NAR children when matching visual information was added; whereas NAR children showed a greater decrease in auditorally-correct responses when mismatching visual information was added. Thus, AR infants have deficits in auditory processing, but older AR children better benefit from matching visual information than NAR children, possibly to redress this deficit. Moreover, NAR children showed positive correlations between auditory-visual performance and phonological awareness. AR children showed no such correlations, suggesting a closer association of auditory-visual speech processing to language development in NAR than AR infants.

[PS-2.4]

Infants' neural speech discrimination predicts individual differences in grammar ability at 6 years of age and their risk of developing speech-language disorders

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The sensitive period for phonetic learning posits that between 6 and 12 months of age, infants' discrimination of native and nonnative speech sounds diverge. Individual differences in this dynamic processing of speech have been shown to predict later language acquisition up to 30 months of age, using parental survey. Yet, it is unclear whether infant speech discrimination could predict longer-term language outcome as well as risk for developmental speech-language disorders, which affect up to 16% of the population. The current study addresses this question by reporting a prospective prediction of speech-language skills at a much later age: 6 years-old, from the same children's nonnative speech discrimination at 11 months of age. Nonnative speech discrimination was indexed by mismatch responses (MMR) measured in magnetoencephalography (MEG), with a focus on temporal and prefrontal cortical regions. At 6-years-old, these children's speech-language skills were comprehensively evaluated by a speech-language pathologist, with two main outcome measure types: individual differences in spoken grammar, and presence versus absence of speech-language disorders. Using regression methods, it was shown that the MMR in the prefrontal cortical region at 11 months significantly predicted individual differences in spoken grammar skills at 6 years. Further, using a machine-learning classification method, it was also shown that the prefrontal MMR at 11 months accurately identified presence versus absence of speech-language disorders. These results represent new evidence that advanced our theoretical understanding of the neurodevelopmental trajectory of language acquisition and early risk factors for developmental speech-language disorders.

[PS-2.5]

Neural processing of speech is related to cognitive skills in infants

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The sensitive period for phonetic learning (~6-12 months) is one of the earliest milestones in language acquisition where infants start to become specialized in processing native speech. Concurrently, during this period, it has also been documented that infants' cognitive skills develop rapidly. Yet, the association between speech learning and cognitive skills have only been examined in two known studies at a single age. In the current study, infants were longitudinally assessed at 7 and 11 months. Their neural processing of native and nonnative speech was indexed by the mismatch response (MMR) using magnetoencephalography (MEG). Their cognitive skills were indexed by the behavioral performance on a flexible learning task that probed infants' ability to learn two different associations, concurrently, over 16 trials. An exploratory machine-learning regression analysis approach was used to examine the correlation between whole-brain MMR and the behavioral task performance. For native MMR, there were significant concurrent correlations with the behavioral task performance at both 7 and 11 months with similarly underlying spatiotemporal patterns. In contrast, for nonnative MMR, there was only a significantly concurrent correlation with the behavioral task performance at 11 months with a slightly different spatiotemporal pattern. These results demonstrated that while both native and nonnative speech processing are already related to cognitive skills in infants, different mechanisms may be underlying these associations.

[PS-2.6]

Seeing is hearing: Neural and behavioural adaptations in children with hearing loss before cochlear implantation

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Children with hearing loss (HL) acquire language from a speech signal with poor auditory information, so they require neural and behavioural adaptations to be able to learn how to communicate using spoken language. Evidence for neural adaptations has been found in adults in the form of cross-modal reorganization (CMR), which refers to the activation of auditory brain areas in response to visual-only stimuli. Here, we asked whether CMR is present in children with HL, and whether it relates to children's stronger reliance on visual speech cues during speech perception (greater attention to a speaker's mouth).

Eight children with HL before cochlear implantation and eight typically-hearing (TH) age-matched controls participated in this study (mean age = 25.47 months). Children are part of a longitudinal study assessing pre- and post-cochlear implantation, and here we only report pre-implantation data. Children's CMR was measured in fronto-temporal brain areas using fNIRS during the presentation of 9 visual-only videos that did not contain any linguistic information (moving shapes). Channel-by-channel analyses showed evidence of CMR in 5 channels; all channels but one showed higher activations to visual stimuli in children with HL than TH controls. Children also completed an eye-tracking task where they watched 8 videos of a woman talking while their gaze patterns to the speaker's mouth were recorded. Half of the videos were presented with sound and half without sound. Across conditions, children with HL showed a trend of directing fewer looks to the mouth than their hearing peers, although this difference did not reach statistical significance. Finally, CMR in left temporal areas was significantly correlated with the looks to the mouth in the eye-tracking task. These results suggest that greater neural adaptation (higher CMR) pre-implantation is linked to greater behavioural adaptation during speech perception (higher looks to the mouth) in children with HL.

[PS-2.7]

Selective attention to the mouth of signing faces

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Previous research has reported a U-shaped developmental pattern in the way infants explore talking faces (Lewkowicz & Hansen-Tift, 2012): very young infants (4 months of age) preferentially look at the eyes, at 8-10 months of age they prefer looking at the mouth and children and adults prefer looking to the eyes. Mixed results have been reported concerning different patterns for monolingual and bilingual infants, whether bilinguals pay more attention to the mouth area for a protracted period of time. Here, we explored the gaze patterns of 8- and 12- month-old monolingual and bilingual infants using an eye-tracker when presented with a speaker signing in Japanese or British English (with no auditory information). Sign languages are produced by a combination of hand, body and articulatory movements in the mouth region. Preliminary data show that 12-month-olds attend to the mouth more than 8-month-olds, but no difference between monolingual and bilingual infants. Data collection is still ongoing.

[PS-2.8]

The influence of dyslexia risk status on child language timing measures

Carmel Brough [1], Áine Ní Choisdealbha [1], Sinead Rocha [1], Adam Attaheri [1], Helen Olawole-Scott [1], Christina Grey [1], Natasha Mead [1], Maria Alfaro e Oliveira [1], Isabel Williams [1], Samuel Gibbon [1] & Usha Goswami [1]

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The Cambridge UK BabyRhythm Project is a longitudinal study of 122 infants investigating rhythmic neural entrainment and sensorimotor synchronisation in relation to language acquisition. Here we present children's language timing measures during free play at 30 months. Children with a reported familial risk of dyslexia (N = 19, AR) are compared to children with no reported risk (N = 82, NAR). Smith and colleagues (2006, 2008) have reported differences in spontaneous speech timing measures between children with a high versus low risk of familial dyslexia, with further distinctions evident when assessing those later diagnosed with dyslexia.

Five minute recordings of N = 101 child-adult dyads were taken during free play with toys. The sample were recruited as typically-developing, but some families later revealed a history of dyslexia. There were no differences in children's recorded between-speaker pauses based on risk status (AR M = .823, SD = .199; NAR M = .763, SD = .208; $t(99) = 1.153$, $p = .126$), nor in children's recorded within-speaker pauses based on risk status (AR M = .771, SD = .183; NAR M = .724, SD = .164; $t(97) = 1.116$, $p = .134$). However, child speaking rate (syllables per second) was greater for those with a familial risk of dyslexia (M = 2.549, SD = .353), compared to those with no known risk (M = 2.352, SD = .481; $t(99) = 1.679$, $p = .048$). This finding contrasts with the prior data of Smith and colleagues, who found significantly fewer syllables per second for their AR group at 24 months. However, risk status is not yet confirmed by a dyslexia diagnosis, and participating families were aware of our focus on speech rhythm. Our ongoing analyses are investigating the relationship between child language timing measures and other domains of language acquisition, including semantics and phonology.

[PS-2.9]

Conversational turn-prediction abilities in bilingual toddlers

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During a conversation, speakers can accurately identify when it is their turn to speak by anticipating the completion point of their interlocutor's conversational turns (CT). Adults do so by relying on contextual, lexico-syntactic, and prosodic cues. Young children do not have all these cues at their disposal. At one year of age, they predict the completion of CTs by relying solely on prosodic cues, especially when presented with prosodically exaggerated infant-directed speech (IDS) (Kalashnikova & Kember, 2021). The early ability to rely on lexico-syntactic cues appears to emerge between 30 and 36 months of age.

It is currently unknown whether bilingual children's turn-taking abilities follow a similar developmental trajectory given that they face the additional challenge of learning and differentiating two sets of prosodic and lexico-syntactic cues to CT completion in each of their languages. This study included 30-month-old bilingual toddlers acquiring Spanish and Basque, two languages that differ drastically in prosodic, lexical, and syntactic structure (data collection is currently in progress, expected N = 16). Toddlers completed an eye-tracking anticipatory looking paradigm in which they observed interactions between two puppets who spoke in Spanish or Basque and in IDS or adult-directed speech (ADS). To directly test the extent to which toddlers weigh prosodic and lexico-syntactic cues to predict the completion of CTs, the completion points were marked by prosodic and lexico-syntactic cues for half the utterances in each conversation, but only with lexico-syntactic cues for the other half. As previously shown for monolinguals, bilinguals are predicted to more accurately predict CT completions in IDS compared to ADS. Critically, more accurate predictions are expected for turns marked by prosodic and lexico-syntactic cues in bilinguals' two languages. We predict that individual ability to rely on solely lexico-syntactic cues in a language will relate to children's degree of exposure to that language.

[PS-2.10]

Early language processing skills in monolingual and bilingual infants

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Research has shown that infant speech and language processing abilities are correlated with later language outcomes (Cristia et al., 2014), both in typically developing children and in children with language disorders. But, despite the increasing number of children growing up in bilingual settings and the promise of processing measures for the detection of language impairments in bilingual children, correlations between language perception and processing in infancy and later language outcomes have not yet been explored systematically in bilingual children (Peña & Bedore, 2018).

In our project, we plan to follow 70 monolingual and bilingual French-learning children longitudinally from the age of 8 months to 3 years. We developed individualized versions (Houston et al., 2007) of seminal looking time tasks (e.g., Marcus et al., 1999; Saffran et al., 1996) to assess infants' language perception, processing and learning capacities via eye-tracking, tapping both into language-specific knowledge of French, and into more universal skills linked to the processing and learning of new language structures. We hypothesized that all types of measures will predict language outcomes in monolingual children, but the latter will be better predictors for bilingual children, whose knowledge of any particular language is strongly influenced by their changing language exposure patterns. We also use parental questionnaires to assess first non-verbal and verbal skills, as well as an interaction task to observe children's non-verbal language precursors (such as joint attention and pointing), as well as standardized language assessment batteries at 3 years. Here, we will present on pilot results (n~70) of the 8-month-phase (with eye-tracking tasks e.g. on phonetic discrimination and word segmentation). Our study will provide important insights to the field of bilingual and monolingual language acquisition research, as well as to longstanding debate on the language-specificity of language learning mechanisms.

[PS-2.11]

Exploring differences between monolingual and multilingual infants on the CDI and ASQ

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The Cambridge BabyRhythm Project is a longitudinal study of 122 infants (65 male, 92 monolingual), investigating rhythmic entrainment in relation to language acquisition. Here we ask if monolingual- and multilingual-exposed infants performed differently on both broad indices of development marked by the Ages and Stages Questionnaire (ASQ), and vocabulary marked by the CDI. The ASQ is a parent-report assessment of communication, gross motor, fine motor, personal-social, and problem-solving domains, administered to our sample at multiple timepoints between 2-30 months. The UK-CDI is a checklist of infant receptive and expressive vocabulary, administered between 10-30 months. Bayesian independent-sample t-tests were used in both domains to test the hypothesis that there was a difference in performance between monolingual and multilingual infants, compared to the null hypothesis of no difference.

We do not find convincing evidence supporting differences between groups in any domain of the ASQ, at any age, with moderate evidence supporting the null hypothesis in many instances (all BF10 = 0.24 - 1.29). In the CDI, between 10-15 months, there is inconclusive evidence to support a difference between groups (all BF10 = 0.31 – 1.37). However, by 24-months, the two populations begin to diverge, with moderate evidence for a monolingual advantage in production (Mono M words = 294.69, Multi M = 186.43 , BF10 = 7.69) and substantial evidence for comprehension (Mono M = 456.53, Multi M = 337.05, BF10 = 41.28). Our results suggest that infant vocabulary estimates begin to diverge according to linguistic environment at 2 years of age. However, this is not reflected in broader advantages or disadvantages across motor, social and communicative domains in the first three years. With our diverse multilingual sample, we next intend to examine how level of exposure to secondary language and the diversity of linguistic features (e.g. stress timed vs. syllable timed) predict performance.

[PS-2.12]

How dialectal variability affects early word form recognition - Testing mono- and bi-varietal children via an App

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Words in an unfamiliar accent (regional or foreign) are recognized only towards the second year of life [1-3]. So far, we know very little about word recognition in children who grow up with two varieties of one language at a time ('bi-varietal' children). In fact, their lexical representations might be more flexible compared to their mono-varietal peers [4]. [5] recently assessed the recognition of Standard German word forms in two groups: a) German 12-18-month-olds with Standard German input only ('mono-varietal') and b) German 12-18-month-olds with dialectal and Standard German input ('bi-varietal). Looking-time data to word- vs. nonce-word-lists were collected remotely via an App and analyzed semi-automatically. Results showed a familiarity preference (longer looking time to words) in the mono-varietal group, and a novelty preference in the bi-varietal group (longer looking time to nonce-words), suggesting successful recognition in both groups. The novelty preference, which was also observed for an older mono-varietal group (18-24-month-olds), may be indicative of more mature word-form processing mechanisms in bi-varietal children – possibly caused by the increased phonological variability in their input [6] and more connected (pre)lexical representations.

The present contribution extends [5], testing 12-24 month-old mono-varietal vs. bi-varietal children on dialectal stimuli (Swabian-Alemannic) in a word recognition paradigm implemented in the App. Preliminary looking-time data from 11 mono-varietal children reveal a trend towards a familiarity preference with increasing age, which corroborates earlier studies [1-3]. Testing of a bi-varietal group (exposed to Swabian-Alemannic and Standard German) is underway. If they indeed process words forms more maturely, we expect to replicate the novelty preference observed in [5] with stimuli spoken in the dialect they are regularly exposed to. We will discuss the implications of our findings for word recognition and lexical representations, and, from a methodological perspective, highlight the opportunities and challenges that come along with remote testing.

[PS-2.13]

Impact of bilingual books on the use of extra-textual talk during bookreading interactions in bilingual parent-child dyads

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Research emphasizes that early bookreading interactions are important in fostering strong oral language skills (Dickinson et al., 2010). Extra-textual talk (ETT) in particular predicts later oral language skills in young infants (Muhinyi et al., 2019). While ETT has been extensively investigated in monolingual families, it remains under-explored in bilingual families. Little is known about how reading monolingual vs bilingual books affects the use of ETT in book-sharing interactions between bilingual parent-child dyads. The current study investigated how reading a Spanish-English bilingual book vs an English monolingual book affects ETT in bookreading interactions among Latinx bilingual parent-child dyads.

We analyzed data from a subset of 10 bilingual parent-child dyads in a larger study. Participants enrolled when infants were 1-3 years old (M=22 months) and vocabulary was assessed; parent-child dyads participated in booksharing observations over Zoom when children were 3-4 years old. Each dyad shared two books: One monolingual (English-only) and one bilingual (English-Spanish). Book type and order was counterbalanced across participants. Interactions were transcribed and ETT was analyzed using SALT. Parents used a higher proportion of Spanish word types (MBil=0.361, MMono=0.25, p=0.003) and tokens (MBil=0.338, MMono=0.262, p=0.048) with the bilingual book than with the monolingual book, but showed no significant differences in the proportion of Spanish utterances. Children showed no differences in the proportion of Spanish utterances, types, and tokens between the monolingual and bilingual book. Relations with infant vocabulary will be reported. When sharing books with their infants, bilingual parents used ETT in both English and Spanish, yet they used more words and more different words in Spanish when sharing a bilingual vs a monolingual book. These findings suggest that bilingual parents use both of their languages during booksharing, and that reading a bilingual book may support parents' use of the home language, supporting infants' bilingual language development.

[PS-2.14]

Lexical-semantic activation in dominant and non-dominant languages of French-Spanish and French-English bilingual toddlers: an ERP investigation

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Lexical-semantic organization by taxonomic categories emerges by two years in monolingual children, or even earlier in 18-month-olds with higher vocabulary skills. Some evidence suggests that lexical-semantic priming in bilingual language learners occurs only for the dominant language (Singh, 2014), and dominant and non-dominant languages activate different neural substrates for priming in 2- to 4-year-olds (Sirri & Rämä, 2019). In the current event-related potential (ERP) study, we investigated whether bilingual (French-Spanish and French-English learning) 24- to 30-month-olds activate semantic relations between words similarly in their dominant (French) and non-dominant (Spanish or English) languages. All participants were exposed dominantly to French (on average 70% of linguistic exposure). Participants were presented with taxonomically related and unrelated spoken word pairs using a mixed-language priming paradigm (word pairs in both languages were presented in the same experimental block). There was no main effect of language dominance, suggesting that a similar priming effect was obtained for the dominant and the non-dominant languages. The N200 was more pronounced for unrelated than for related word pairs only in the group of toddlers learning French and Spanish. No effect was found in the English-learning toddlers. The N400 response was more pronounced for unrelated than for related word pairs in both language groups. The N400 effect was distributed over the bilateral frontal recording sites in toddlers learning French and Spanish, while in toddlers learning French and English, the N400 was observed only over the left hemisphere. The vocabulary knowledge had no effect on the magnitude of components. The current results suggest that the priming effect occurs in both dominant and non-dominant languages, but the language pair might influence the magnitude and/or the distribution of the priming effect.

[PS-2.15]

The emergence of inhibitory links in the developing lexicon: insights from bilingual participants

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The emergence of inhibitory links in the developing lexicon has been reported to occur at around 18 months of age, and to be dependent on toddlers' vocabulary size (Chow et al. 2016, 2019). This finding is compatible with two accounts. One possibility is that inhibitory connections emerge only after the child has acquired a critical amount of word-forms (total vocabulary). Another possibility is that the number of concepts the child has a word for (conceptual vocabulary) plays a more central role. It is currently not possible to determine which hypothesis explains these developmental patterns better: previous studies have relied exclusively on monolingual participants, for whom the two measures of vocabulary size are virtually identical. In this study, we address this issue by testing bilingual toddlers, who frequently know more than one word-form for the same concept (one in each language, e.g., dog-perro), and therefore might have different total and conceptual vocabularies. We tested monolingual and bilingual toddlers aged 20 to 32 months in an adaptation of Chow et al. (2016)'s experimental task. We present preliminary data (data collection is ongoing) from 43 monolinguals and 26 bilinguals suggesting that, in line with previous studies, participant's recognition of an object semantically related to a previously presented object (e.g., cat-dog) was delayed when an object from a different semantic category (e.g., a train) was displayed and named in between, compared to when a neutral checkerboard (and an auditory tone) was presented instead. Interestingly, a model including total vocabulary as predictor fitted the data better than one including conceptual vocabulary. Overall these preliminary results point to total vocabulary (number of acquired word-forms) as playing a more central role in the emergence of inhibitory connections in the developing lexicon.

[PS-2.16]

How to build a CDI: insights from adaptations to 40 different languages

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The MacArthur-Bates Communicative Development Inventories (CDIs), aimed at children aged 8–30 months, have been adapted to more than 100 languages. During CDI-adaption, the linguistic and cultural specifics must be considered, rather than just translating the original list. The adaptation instructions are rather general and the approaches taken differ in many aspects. To date, we collected data on 40 adaptations including minority languages, multilingual societies and rural areas .

To assemble the target word and gesture lists, a variety of methods were used: corpora-based, translation, multiple administrations, focus groups, mothers' interviews. In the norming stage, majority of studies used paper and a few relied on online forms; answers were collected predominantly from mothers. As for sample size and included factors, such as SES, maternal education, birth order, number of siblings, bilingualism, or health conditions, there is considerable variability across CDI adaptations. Reliability is mostly evaluated through internal consistency; less often through test-retest reliability or interrater reliability. Validity is typically reported against spontaneous sample measures (number of word types, MLU). The adaptations differ in how they account for age. This review combines insights from many adaptations to sufficiently cover all the stages of the CDI creation process. We will present a list of possibilities as well as recommendations for CDI adaptations, which should help researchers across communities develop a CDI for their language.

[PS-2.17]

Language measures in the YOUth cohort: Validating the modified N-CDIs and PPVT-III-NL

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YOUth is an ongoing, longitudinal cohort study following Dutch children from preterm to early childhood (Onland-Moret et al., 2020). We sample receptive vocabulary in various ways and across various ages: at 10 months and 3 years, we use age-adapted versions of the Dutch Communicative Developmental Inventory (N-CDI). In addition, 3-year-olds participate in a touch-screen version of the Dutch Peabody Picture Vocabulary Task (PPVT-III-NL). For the N-CDI, typical Flemish words are replaced by Dutch synonyms and long and short forms are uniquely combined. The first aim is to examine the modified N-CDI's concurrent and predictive validity and reliability. The second aim is to assess to what extent individual differences affect vocabulary size and test validity. There are many factors affecting vocabulary size, for example, caregivers' socio-economic background (Hart & Risley, 1995), infant sex (Reese & Read, 2000), bilingualism (De Houwer, 2019), and preterm birth (Brósch-Fohraheim et al., 2019). It is important to determine whether these factors also affect test validity before we can reliably use these tasks to predict children's vocabulary outcomes. Currently, we collected 1,146 N-CDIs of 10-month-old infants and 290 N-CDIs of 3-year-old toddlers. We also administered the PPVT with 424 3-year-olds. Of this sample, 247 participants have filled out the N-CDIs at both time points and completed the PPVT. We are using automated measures to calculate raw scores and standard scores. Caregivers also filled out questionnaires regarding their level of education and income, children's birth weight and gestational age, and languages spoken at home. In the coming months, we are completing descriptive analyses of all vocabulary scores, calculating Pearson's correlations to assess test validity and reliability, and fitting linear mixed-effects models to assess individual effects. The results will show whether we can reliably use these tasks in future studies examining children's vocabulary development in the YOUth cohort.

[PS-2.18]

Coping with dialects from birth: Role of variability on infants' early language development. Insights from Norwegian dialects

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Effective language use entails the ability to understand speakers across accents (e.g., dialects and foreign-accented speech), who might differ in phonetic detail from the familiar (native) accent but preserve word phonological structure. How do infants growing up in multidialectal environments adapt to this variability?

This preregistered study compared early language development in Norwegian infants exposed to one or two dialects from birth and assessed the role of parental dialect similarity in infants' word recognition and comprehension. 12-month-old Norwegian-learning infants, exposed to parents speaking the same (n=35) or two Norwegian dialects (n=35), took part in two eye-tracking tasks, assessing familiar word-form recognition using preferential listening paradigm (8-item familiar word lists vs 8-item pseudoword lists) and word comprehension, using intermodal preferential listening (16 words). Both of their parents' speech was recorded and assessed for similarity by native speakers. First, in contrast to previous research, our results revealed no listening preference for words over nonwords in both monodialectal and bidialectal infants, suggesting potential language-specific differences in the onset of word recognition. Second, the results showed evidence for word comprehension in monodialectal infants ($p=.015$), but not in bidialectal infants ($p=.40$), suggesting that exposure to dialectal variability impacts early word acquisition. Third, we observed perceptual similarity between parental dialects to tendentially facilitate bidialectal infants' word recognition and comprehension ($r=-.28$, $p=.05$). Forth, the results revealed a strong correlation between the raters and parents' assessment of similarity between dialects ($r=.83$, $p=.001$), indicating that parental self-estimations can be reliably used to assess infants' speech variability at home. Finally, our results revealed a strong relationship between word recognition and comprehension in monodialectal ($r=0.53$, $p=0.001$) and the absence of such a relationship in bidialectal infants ($r=-0.02$), suggesting that either these two skills do not necessarily align in infants exposed to more variable input, or that the alignment might occur later.

[PS-2.19]

Early predictors of language outcomes: Prosody and gestures

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An early sensitivity to prosody has been suggested to facilitate language learning. Early gesture development has also been suggested to pave the way for language development. However, the strength of prosody and gestures as predictors of later language outcomes is still largely unknown. This longitudinal study investigated whether early prosodic and gesture development (assessed before 18 months) predicted receptive and expressive vocabulary outcomes (at 18, 24 and 30 months) in three groups of children: typically developing (TD), at risk for language impairment (AR), and with Down Syndrome (DS). We used data from three parental reports: the ProsoQuest, a new parental report of prosodic skills, and the Social Composite of the Communication and Symbolic Behavior Scales Infant-Toddler checklist (comprising emotion and eye gaze, communication and gestures), as predictors; and the CDI short forms for infants and toddlers, as outcome measures. For prosody, 23 and 79 pairs of reports were analyzed respectively for receptive and expressive vocabulary; for gestures, 28 and 101 pairs of reports were analyzed. The linear mixed models analysis (Table1) revealed that prosody comprehension predicted receptive vocabulary development, whereas prosody production predicted expressive vocabulary development. Surprisingly, better prosodic skills related to lower receptive vocabulary outcomes, suggesting that infants rely more on prosodic-based comprehension tools than lexical decoding early in development. There was no interaction with group, although AR and DS had significantly different CDI scores from TD. Gestures predicted both receptive and expressive vocabulary, with no interaction with group. Importantly, neither the infants' age of the predictor nor the time interval between the predictor and the outcome modulated the strength of the predictor. We concluded that both prosody and gestures are early predictors of vocabulary outcomes. Furthermore, the impact of prosodic skills and gestures on later lexical development was found to be similar in typical and atypical language acquisition.

[PS-2.20]

Infants use word-level stress for word recognition

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If syllable stress distinguishes words in a language (like German), adult native listeners use this cue to identify spoken words. However, even in languages that allow the position of the stressed syllable to vary, there often is a dominant stress pattern. In German, for example, disyllabic words are typically stressed on their first syllable. Previous work showed that infants are sensitive to the typical stress pattern of their native language and that they use the predominant stress pattern as a hint to localize where possible words start. Here, we asked whether infants use syllable stress also for identifying first words, i.e., whether their proto-word representations encode prosody. Within a looking-while-listening paradigm, we presented 4 to 15-month-olds (N=28) displays of two pictures (a car and a plate) while they heard a spoken target noun. The disyllabic target was either correctly stressed on the first syllable (“AUto", Engl., car), or it was incorrectly stressed on the second syllable (“auTO”). In its canonical form, the spoken word was a label for one of the two pictures. The carrier sentence included a pause before the target (“Look at the_car”) to enable segmentation before target onset. Multiple analyses of eye movement data –taking possible picture preferences into account– indicated that infants looked longer to target pictures when hearing the correctly stressed target (compared to hearing the incorrectly stressed target). By calculating overall looking time to the whole display, we found enhanced fixations when infants heard incorrectly stressed words as compared to correctly stressed words. This either might reflect a novelty preference towards an unfamiliar stress pattern of a known word or at least a typical word; or enhanced search effort for the referent given the incorrectly stressed label. In sum, our results suggest that proto-word representations in German-learning infants are already specified for syllable stress.

[PS-2.21]

Is tactile rhythm perception related to early language skills? an explorative study

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The ability to process rhythm is a powerful cognitive tool for the encoding of temporal and sequential stimuli (Patel, 2006). During the earliest stages of language acquisition, infants make use of rhythmic cues to organize their linguistic experience (Nazzi et al., 1998), assign word boundaries (Cutler and Norris, 1988), and bootstrap into the syntax of their native language (Christophe et al., 2003). Moreover, recent findings indicate that atypical rhythm processing is an underlying impairment in different speech/language disorders (Ladànyi et al., 2020). However, further research is needed to better consider its role as an early marker of language acquisition. The present study investigated the relationship between sensitivity to rhythm and early language abilities in 40 infants between 7 and 36 months. In a first experiment, infants' rhythm discrimination was measured through a familiarization-test paradigm. Rhythms were presented in tactile modality through a custom-made vibrotactile device for music perception. Touch is a sensorial modality that plays a central role in infants' perception; moreover, a vibrotactile rhythm experience can be common to infants with and without sensorial disabilities (visual or auditory), representing thus an excellent candidate measure also in the early assessment of children with hearing loss, who are at higher risk of language atypical development. In a second experiment, infants were tested in a verbal-learning task and their performance was correlated to their vibrotactile rhythm perception. In both experiments, pupillometry and looking times toward contingent visual stimuli were collected by an eye-tracker and interpreted as indexes of attentional engagement. Statistical analyses showed that: i) infants were able to discriminate between different rhythms in vibrotactile modality, and ii) their performances in the verbal-learning task correlated with early sensitivity to rhythm. These results point toward a potential role of rhythm perception tasks in contributing to the early assessment of infants' language development.

[PS-2.22]

Language-mediated selective attention in 18- and 26-month-old toddlers

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While language effectively orients attention towards the named objects, how the linguistic input drives attentional processes is yet to be understood. The present study tested the impact of language and spatial priming on attention orienting in 18- and 26-month-old toddlers. To address this question, we developed a novel eye-tracking paradigm, whereby two objects are presented in one of four possible locations and one of the objects is labelled (prime phase). The impact of labelling on attention orienting was tested in a following probe phase, where either the identity, location or both were manipulated. Two objects were presented, either identical or a new identity, in the same locations as previously, neutral locations, or conflicting locations. In the spatial version of the task, labelling was replaced by visual highlighting, which enabled us to compare the impact of language-mediated and spatial priming on selective attention. Comparison of the language- and spatially-driven cueing revealed that both language and spatial cues orient attention. The results revealed an impaired response to a target that was previously ignored, providing evidence for negative priming effect. In addition, there was no inhibition of the previously attended target, suggesting no presence of inhibition of return. These results suggest that information attended during the prime phase facilitates attention orienting during the probe phase while ignored features are inhibited. Our findings suggest that language-mediated attention operates differently than spatial priming, with language overcoming inhibition more flexibly as compared to spatially-mediated attention. In addition, different looking patterns observed in 18- and 26-month-olds suggest the role of vocabulary development in mediating the impact of language on attention.

[PS-2.23]

Mask wearing in Japanese and French nursery schools: The perceived impact of masks on communication

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The amount and the clarity of caregiver speech have been shown to promote language acquisition (e.g., Hoff, 2003; Golinkoff et al., 2015). Whether recent changes in children's communicative environments during the Covid-19 pandemic, such as mask wearing, have affected these 'favourable learning features' is unclear. Here, thus, we investigated how daily mask wearing affects communication in nursery schools. We asked early childhood educators (ECEs) to compare communication at their nursery school when they wear a mask to when they do not in an online survey. To isolate the effect of mask wearing from the potential confounds of country and linguistic differences, we recruited ECEs from two countries, France (n=177) and Japan (n=138). The survey was focused on three key dimensions of communicative environments that affect language acquisition: (1) the amount of verbal communication; (2) the acoustic features of verbal communication; and (3) non-verbal communication. It probed ECEs' communication to infants, toddlers and colleagues, as well as children's and colleagues' communication to ECEs. Our results revealed that ECEs felt that the quantity of verbal communication decreases when they wear a mask ($p<0.001$), but that the quality of verbal communication ($p<0.001$) as well as non-verbal communication increases ($p<0.001$). Increases in quality of verbal communication and non-verbal communication were positively correlated ($p<0.001$). Reported decreases in verbal communication were greater for ECEs in France than in Japan ($p<0.001$). Results were, for the most part, consistent across communication target age groups. These results suggest that mask wearing may heterogeneously affect the favourable learning features of children's communicative environments: the quantity of verbal communication may decrease, but the quality of verbal communication and non-verbal communication may increase. Early childhood educators may be adapting favourable learning features to the current environment to best promote children's language development.

[PS-2.24]

Phonological Abstraction in Early Infancy: An Amodal Speech Perception Study

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Choi et al. (2017) trained two groups of adults on the three-way Korean consonant distinction, [t*, t, th], and found that Korean-born Dutch speakers adopted from Korea as young as 3 months learned the distinction faster and better generalised their learning to velar and bilabial places of articulation, and to speech production than did age-matched Dutch controls. This implies but does not directly demonstrate very early phonological abstraction in infancy. This study aims to clarify whether and how 6–12-month-old infants might develop phonological abstraction. Due to COVID-19 constraints we first used the online platform, Lookit, (N=21 and ongoing), and later complemented this with lab-based studies using Habit (N=10 and ongoing). In both, in the Exposure phase, infants were trained on two categories of nonwords presented in either the auditory or visual modality. Words with labial consonants, e.g., bivawo, were followed by a jellyfish image, and those with tongue-tip consonants, e.g., dizalo, were followed by a crab image. In the Test phase infants were presented with Congruent (same as Exposure) pairings, or Incongruent pairings, in which the nonword-image pairings were reversed, in the modality different from that in Exposure (A-then-V and V-then-A groups). The results were similar in online and lab-based testing: there were no significant effects in the V -A group but in the A-V group infants looked longer for Incongruent than for Congruent test trials in Block 1, but not in Block 2. These results imply that very young infants show (i) phonological abstraction of categories of nonwords with labial vs tongue-tip consonants, and (ii) maintain this abstract category learning across modalities – in auditory to visual (but not a visual to auditory) cross modal transfer. This learning is evident early (Block 1) but not later (Block 2) in Test trials, possibly due to some fatigue effect.

[PS-2.25]

Six-month olds detect a novel speech sound contrast more effectively from unfamiliar rhythm

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Three-month-olds recognize atypical realizations of native-language speech [Kitamura et al., 2006], 10-month-olds prefer engaging with native-accented talkers [Kinzler et al., 2007], while 17-month-olds learn new words selectively better from native talkers [Mattock et al., 2010; Fennel & Byers-Heinlein, 2014]. At the same time though, at about the age of 6 months, infants preferentially listen to non-native accents [Butler et al., 2011; Paillereau et al., 2021]. We ask whether, like words, also phonetic categories are learned better from native talkers, or alternatively whether they are learned better from novel, nonnative accents to which young infants attend preferentially.

To discover the segmental categories of their language, infants exploit the sounds' distributional statistics [Maye et al., 2002; Wanrooij et al., 2014]. Here we tested whether infants detect a novel phonetic contrast with differing success from native-accented than from nonnative-accented speech. We recorded utterances spoken with typical and atypical rhythm of the infants' native language (Czech) and delexicalised them by replacing consonantal intervals with [f] and vocalic intervals with one of 406 tokens sampled from a bimodal distribution between [ɛ] and [æ]. Six-and-half-month old Czech infants were first exposed to either the native- or nonnative-accented delexicalized material and subsequently tested with non-alternating trials of [fɛ] and alternating trials of [fɛ]-[fæ] (counterbalanced). Data from 34 infants (collection ongoing) indicate an interaction of familiarization condition and test type, whereby only infants familiarized with the [ɛ]-[æ] contrast in atypical rhythm looked longer to non-alternating than to alternating test trials (atypical fam: non-alt = 8.55s, alt = 6.47s, $p = 0.064$; typical fam: $p = 0.737$). In sum, 6-month old infants seem to more effectively exploit distributional information from speech with atypical, non-native, rhythm. This is in line with their previously reported preferences for listening to novel over familiar accents.

[PS-2.26]

The impact of spectrally degraded speech on the word segmentation abilities on infants with normal hearing

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The current study adopts a psychoacoustic approach to explore the effect of acoustic degradation on wordform perception in 6-month-old infants with normal hearing. This approach models the decomposition of the spectral and temporal components of speech by the auditory system. Experimentally these acoustic cues can be selectively manipulated using vocoders, to assess their role in speech perception and processing for listeners with normal hearing.

Three vocoder experiments were conducted using a passage-wordform segmentation task via the Headturn Preference Procedure (HPP) on French-learning 6-month-olds. In all three experiments, infants (N=24) first accumulated one minute of looking time to target word(s) from a 6-sentence passage in the familiarization phase. Following, in the test phase, infants' looking time preference for isolated familiar v. novel words was measured. In Experiment 1, original stimuli from Nishibayashi & Nazzi (2016) were processed by an 8-band vocoder and presented two target and two novel words at test. Likewise, Experiment 2 used an 8-band vocoder, but presented only one target and one novel word at test. Experiment 3 (N=23/24) used a less-degraded 16-band vocoder and presented one target and one novel word at test. If 6-month-old infants are able to rely on spectrally reduced speech signals, it is expected they will show preferential orientation toward familiar stimuli, as shown by previous studies using natural stimuli. No difference in preferential orientation time was found between familiar v. novel stimuli in the two 8-band vocoder conditions. Preliminary analyses on 23 infants of the 16-band condition also show no preference between familiar v. novel stimuli in Experiment 3. The null results suggest that fine spectral information may be necessary for lexical processing in wordform segmentation tasks at 6 months of age. To better understand the role of spectral information for word segmentation abilities during early development, 10-month-olds will be tested.

[PS-2.27]

The Interrelatedness of Speech and Face Discrimination Beyond Perceptual Attunement

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During their first year, infants become more sensitive to native and less sensitive to non-native contrasts (Werker & Tees, 1984). This pattern is called perceptual attunement and is also found in face perception with infants becoming more sensitive to discriminate same-race faces and less sensitive to discriminate other-race faces (Kelly et al., 2009). These patterns are suggested to share developmental mechanisms (Maurer & Werker, 2014). Most studies have researched the effects of speech on face discrimination (e.g., Hillairet de Boisferon et al., 2021) and some have investigated the correlations between speech and face processing (Krasotkina et al., 2018; 2021) but research on the effects of facial stimuli on speech discrimination is scarce. This study investigates the interrelatedness between speech and face discrimination during infants' regaining sensitivity to discriminate other-race faces and non-native speech sounds. The infants are expected to regain discrimination sensitivity after a familiarization in which the other-race faces and non-native contrasts are paired with native speech or same-race faces. However, based on findings by Hillairet de Boisferon et al. (2021) it can also be hypothesized that non-native speech and other-race face discrimination are only enhanced when these are combined with other-race faces and non-native speech. Monolingual German-learning 12-month-olds will participate in two experiments using the Stimulus-Alternation Preference Procedure (Best & Jones, 1998). In one experiment infants' discrimination of Asian faces will be tested after familiarization with Asian females pronouncing a native (German /da/ vs. /ta/) or non-native contrast (Hindi dental /d̪a/ vs. retroflex /ɖa/). In a second experiment, infants' speech discrimination of the Hindi contrast will be tested after familiarization with videos of Asian or Caucasian females producing the contrast. The results of the study will be presented at the workshop. The outcome will inform about the interaction between face and speech processing after perceptual attunement.

[PS-2.28]

Memory-card phonetic training of English vowels for bilingual children

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Learning first-language phonetic categories is thought to interfere with second-language phonetic learning later in life. However, it isn't clear how much early exposure (e.g., in the first year) affects learning, as young school-age children retain considerable language-learning capacity. This study tested 104 children (6-12 years) who were living and being educated in a Spanish-Catalan bilingual environment, but whose homes were either monolingual (Spanish or Catalan) or bilingual (Spanish and Catalan, or Spanish and another language). They were trained on English vowels, as part of their English class in school, to test whether their home language and age affected learning. Children played a novel computer-based memory card game in which they clicked on cards that played words when turned over, and had to find pairs of matching English words. Word sets were created from vowel minimal pairs, requiring children to match words such as shout from two talkers while rejecting similar words such as shirt and shoot. Performance was evaluated using a pre/post oddity test; listeners heard three words spoken by animated animals and had to pick the one that said a different vowel. The initial analyses suggested that children improved their perception of English vowels using this novel phonetic training game, with greater learning for contrasts such as beat-bit that children found difficult during the pre- test. Older children learned more than younger children; all groups enjoyed playing the game, but older children may learn better because of cognitive factors (e.g., attention). Older children from bilingual homes learned significantly more than younger children or those from monolingual homes, with the caveat that these older bilingual children started with lower pre-test English vowel scores.

[PS-2.29]

Active learning and feedback in word learning

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How do individuals select information they want to learn about and does feedback on their learning progress have positive effects on learning? Active learning, where learners actively sample the environment, has often been shown to be beneficial for learning. This advantage may arise from learners' opportunity to shape the learning experience according to their needs, examining materials that are relevant to them. In this study, we examine whether adults and 5-year-old children use their awareness of their knowledge of newly learned label-object associations to actively solicit information that will fill existing gaps in their knowledge. Furthermore, we investigate whether providing adults and children with feedback on their learning progress improves learning of novel label-objects associations.

In a cross-situational word learning task, participants see images of novel objects while hearing their associated novel labels. After training, learners indicate the extent to which they know the labels of individual objects. Next, they can actively sample objects whose labels they want to hear again. We expect learners to sample objects whose labels they are less confident about. Participants are then tested on their knowledge of the label-object mappings. Following their response, they indicate their confidence in having responded correctly. One group then receives feedback providing the right answer, while the other group does not. In a subsequent test, we expect participants in the feedback group to show improved learning relative to participants in the no-feedback group. Preliminary analysis highlights uncertainty-driven sampling behaviour in adults, although such behaviour did not predict better performance at test. We also found no difference between participants who received feedback and those who did not receive feedback. Data collection with children is currently taking place. The results with adults highlight the role of uncertainty in driving sampling behaviour as well as disassociations between sampling behaviour and learning performance.

[PS-2.30]

Do German-learning infants rely on word frequency differences within the looking-while-listening task?

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Looking time measures indicated that six-month-old English-learning infants associated an articulated noun (e.g. ear) with the corresponding referent (LWL; Bergelson & Swingley, 2012; 2018). Recent studies with other target languages failed to replicate such an early onset of word recognition abilities in the LWL-task (Kartushina & Mayor, 2019; Steil, Friedrich, & Schild, 2021). Furthermore, there were hints in both studies that extra-linguistic cues, such as word frequency difference between target and distractor might guide infant's gazes in this task. In the present pre-registered online study (via e-Babylab, Lo et al., 2021), we followed up on these findings by testing German-learning 6- to 24-month-olds. In contrast to previous work, we systematically controlled for word frequency differences. To this end, we paired the same target words either with a distractor of the same frequency or with a distractor of different word frequency (established on age-matched parental ratings and the CHILDES database, MacWhinney, 2000). We suggested that frequency matching might guide in particular younger infants when they match spoken labels with referents. Preliminary data of 44 participants (M = 14.80 months, 21 female) indicated noun comprehension for the whole sample. Overall, children below 14 months (n = 22) looked significantly longer to the labeled target, and so did participants above 14 months (n = 22). Intriguingly, when we kept target words constant across word frequency conditions, infants below 14 months of age showed no significant difference in LWL-performance between stimulus pairs with different word frequencies or same word frequencies. This does not confirm the assumption that especially the younger infants rely on a frequency matching strategy to succeed within the LWL-task. However, data collection is still pending, to allow a more fine-graded analysis on the of interest age group between 6 to 10 months regarding potential word frequency effects.

[PS-2.31]

Do toddlers implicitly name familiar objects?: Considering the effects of age and preview time.

Nicola Gillen [1] & Kim Plunkett [1]

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Phonological priming experiments with 18-month-olds suggest evidence for toddlers' implicit naming of objects; internally activate the phonological word forms when encountering familiar objects (Mani & Plunkett, 2010). In an ERP study, Styles et al. (2015) suggested implicit naming of known items also occurs in 14 month-olds. However, whether implicit naming is an "automatic" process is not currently understood. The present study aims to replicate previous findings with 18-month-olds as well as investigate further evidence for implicit naming by extending the 'preview time' that toddlers view items in silence. We also aim to observe whether implicit naming indeed occurs in younger toddlers under the same eye-tracking procedures as has been conducted with older toddlers.

Toddlers aged 12-15 months and 18-months were recruited for this study. For both groups, a prime object is presented in silence followed by the presentation of a target-distractor object pairing. In the 'no preview' condition, the target label is presented 50 ms after the onset of the target-distractor objects. In the 'preview' condition, the label is presented 1000 ms after the onset of the target-distractor objects. 18-month-olds are presented with 'preview' and 'no preview' trials. 12-15 month-olds are presented with 'no preview' trials only. For half of the trials, the prime and target label were phonologically related. Initial results show 12-15 month-olds exhibit a tendency to look more towards the target object on unrelated trials compared to related trials. Moreover, the proportion of looking towards the target is below chance on related trials and a spike of looking towards the target occurs later in the trial. Perhaps suggesting phonologically related primes inhibit target identification. 18-month-olds also looked more towards the target on unrelated trials, but more towards the target on trials with a preview time. Further data and analysis will aid in investigating, and interpreting, results further.

[PS-2.32]

Exploring systematicity in the developing lexicon with phonological networks

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Infants' early words are phonologically similar (Vihman, 2016). Deuchar and Quay (2000) show that 13/20 of a bilingual (English-Spanish) child's first words are produced with a CV structure, and many are identical: car, clock, casa 'house' and cat are produced as /ka/, and papa 'daddy', pájaro 'bird' and panda as /pa/. Network analysis can account for similarity in early phonological acquisition (Fourtassi et al., 2020; Siew & Vitevitch, 2020), whereby similarity between forms determines their connectivity within a network. This approach draws on two possible models: preferential attachment (PAT; new words resemble the most well-connected forms in the existing network) and preferential acquisition (PAQ; new words attach to multiple similar forms). These existing studies test networks of target forms, generating mixed results; it may thus be more revealing to analyse networks of infants' actual productions (i.e. target car /kɑɹ/ ~ clock /klɑk/ ~ cat /kæt/ versus actual /kæ/ ~ /kæ/ ~ /kæ/). I propose that PAT offers a more plausible model for phonological development of actual forms, given that infants tend to adapt early words to fit established production routines (Vihman, 2019).

Here, I use network analysis to observe the connectivity between American infants' target and actual word productions. I analyze over 100,000 words from 5 infants (2 males, Demuth et al., 2006) between 0;11 to 2;6, accounting for phonological distance between each actual form and i) the target form (e.g. clock, /kæ/ vs. /klɑk/) and ii) all other words produced by the child (cat /kæ/ vs. dog /dæ/). Results show that PAT is a better predictor of lexical acquisition ($p<.001$, both target and actual forms). Furthermore, actual forms provided a better fit to this model than target forms ($\beta= 2.33$, $p<.001$); infants' actual forms provide stronger evidence of systematicity than we would expect from analysis of targets alone.

[PS-2.33]

On the Dimensional Structure of Vocabulary and Grammar in Early Language Development

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The relationship between lexical and grammatical knowledge in young children is impressively strong. Indeed, the correlation between productive vocabulary and grammar (r=.84) is larger than that between receptive and productive vocabulary(r=.63) when measured with commonly used Communicative Development Inventories (CDIs). This correlation fits cleanly with usage-based theories of language, which assume no clear distinction between the lexicon and grammar (Goldberg, 1995; Tomasello, 2003). However, it could also reflect separate systems that are mutually causally related (mutualism); initially uncorrelated domains can gradually become so correlated as to be statistically indistinguishable because they are mutually causally related (Van der Maas et al 2006). Disentangling these accounts is complicated by the non-linear relationship between true and measured grammatical/lexical knowledge. Past research that has made use of traditional statistical methods has to date not sufficiently accounted for this non-linearity, complicating any interpretation of the data.

Here we present a new approach to disentangling these accounts which overcomes these measurement challenges. We examined the dimensional structure of item-level data from CDI data on Wordbank (Frank et al. 2017) using item-response theory and the DETECT method (Stout et al. 1996). We first considered all non-longitudinal data from the American English subsample of Wordbank. An exploratory DETECT analysis found weak evidence of multidimensionality, but, crucially, with a split between grammar/predicates and nouns rather than grammar and vocabulary. We then considered two subsamples from longitudinal data on Wordbank (16 and 24 months). Since mutualism assumes uncorrelated cognitive processes become correlated over time, it predicts a multidimensional structure that reduces with age. Neither dataset showed evidence of multidimensionality. In sum, there was no support for separate dimensions for vocabulary and grammar on item-level data on the CDI across three datasets, a result consistent with usage-based accounts.

[PS-2.34]

Season-of-birth effects on infant vocabulary size

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A considerable body of research suggests season-of-birth effects on children's school achievements: children born in the fall outperform those born in early summer. These effects can be attributed to either a maturational gap upon school admission —the maturity hypothesis— or to prenatal aggressions on the central nervous system during pregnancy, that are more susceptible to happen during winter (e.g., viruses, vitamin D deficiency) —the psychopathology hypothesis.

Here, we evaluate whether seasonality of birth affects early language acquisition, using Communicative Development Inventories (CDIs; parental reports that assess vocabulary development). We contacted parents of 12- and 24-month-old infants in waves, every two weeks, over 15 months and collected CDIs (in comprehension and production for 12-month-olds, and in production for 24-month-olds). Our sample resulted in (n=448) 12- and (n=724) 24-month-old monolingual infants from the Oslo region. We transformed CDI scores into gender- and age-based percentiles using Norwegian norms. To estimate the effect of seasonality, we ran beta regressions, controlling for maternal education, on vocabulary percentiles. We modelled seasonal variation by turning birth dates into radians and including the sine and cosine of the resulting variable into the model. We adopted a full-null comparison framework, the null model containing maternal education and the full model having the seasonal effects in addition. Our results revealed significant effects of seasonality on production for 12-month-olds ($\chi2(2)=7.67$, $p=.022$), a borderline effect on comprehension at that age ($\chi2(2)=5.04$, $p=.08$), but no effects on production for 24-month-olds. For all groups, vocabulary sizes peaked in October/November and reached their minima in April/May. In sum, our results suggest that seasonal variations on language development are present before school enrolment and hence provide support for psychopathology hypothesis. However, seasonal effects on vocabulary size appear to fade over time, such that they are not significant anymore by two years of age.

[PS-2.35]

Sensorimotor maturation impacts early lexical processing: initial evidence

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The sensorimotor system and its maturation influence phonological development (Choi et al., 2021; Vilain et al., 2019). We investigate whether these factors affect early lexical processing.

To memorize and recognize words, French-learners rely primarily on vowels before 6 months (Vowel-bias), but show a Consonant-bias from 8 months (Bouchon et al., 2014; Nishibayashi & Nazzi, 2016). Initial bias on vowels might relate to them being better perceivable in-utero; later, consonants might be weighted more since, in French, these are more informative at the lexical level. However, other sensory factors might be at play, namely, sensorimotor maturation: vowel production emerges during the Vowel-bias period and consonant production around the switch to the Consonant-bias. In our HPP study, infants were familiarized with passages containing monosyllabic words and tested with Consonant and Vowel mispronunciations of these words: if the Consonant-bias is present, participants should look longer to V-mispronunciations (Nishibayashi & Nazzi, 2016). Speech sensorimotor skills were investigated through: a babbling questionnaire (Hoareau et al., 2019); the Vocal Reactivity scale (VR) of the Infant Behavior Questionnaire; home recordings (LENA). A Repeated Measures ANOVA was run on preliminary results (18/36 participants) with Type-of-Mispronounciation (V/C-mispronounciation) as the within-subject factor; Production skills (high/low C production, parental questionnaire) as the between-subject factor; VR score as covariate. A significant Type-of-Mispronounciation x Production interaction emerged ($p = 0.011$; $F(1,15) = 8.409$; $\eta p2 = 0.359$): participants producing more consonants (mean = 6.25) oriented more to C-mispronounciation compared to those producing less consonants (mean = 3.33), seemingly displaying a V-bias. Additionally, there was a marginal VR x Type of Mispronounciation interaction ($p = 0.051$; $F(1,15) = 4.463$; $\eta p2 = 0.229$), suggesting that infants with higher VR scores prefer V-Mispronounciations (signalling a C-bias). In the future, we will complete the group and listen to the LENA recordings, adding first-hand production data as a variable.

[PS-2.36]

Supporting referent selection through word form-meaning systematicity

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Language appears to be more systematic than previously assumed, i.e., words related in meaning tend also to be similar in form (Dautriche et al., 2017). Such systematicity can be a powerful cue during early lexical acquisition, allowing infants to narrow down the vast possibility of referent objects when confronted with a novel word by virtue of the word's phonological form. Here we ask whether word form-meaning systematicity bootstraps referent selection. The present study (Stage 1 registered report, accepted) examines whether young children rely on the systematic relation between word form and word meaning when faced with a referent selection task. Eighty-eight 24-month-old children are trained on two novel word-object associations from different object categories (e.g., "maacke"-pangolin and "peto"-jetski). Children are then tested on their retention of these novel word-object associations by presenting them with the trained labels, two trained objects and two other super-novel, perceptually and taxonomically similar objects (e.g., an aardvark and a hovercraft). Critically, to test the reliance of systematicity information, children are also asked to identify the referents of super-novel labels which are phonologically similar to the trained labels (e.g., "maasche" and "pewo") in the presence of the same four objects. We predict that, in the critical systematicity test, when asked for a similar-sounding label, children will fixate the super-novel object of the same category as the trained object. In the example above, when asked for "maasche", children should be biased to the aardvark, suggesting that they make use of word form-meaning systematicity during referent selection. On the other hand, if children look more at the category-mismatching super-novel object (i.e., the hovercraft), it would suggest that children avoid mapping a similar-sounding word to a similar-looking object, i.e., referent selection in ambiguous situations avoids systematic word-form meaning mappings.

[PS-2.37]

The role of word properties in early word learning: A study with Polish Communicative Development Inventories

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There are various word properties that may predict the order of word learning in young children. Large-scale datasets allow us to identify these predictors and build models which capture similarities and differences between languages: Braginsky et al. (2019) have analyzed data from MacArthur-Bates Communicative Development Inventories (CDI) from over 32,000 children and found that their set of word properties, including meaning-based and linguistic environment factors, contributed significantly and consistently to the ease or difficulty of learning individual words across 10 languages.

This study extends the analyses of Braginsky et al. (2019) to Polish and examines how word properties investigated in their analyses influence the acquisition trajectories of Polish CDI items. The study includes norming data consisting of over 3,500 children aged from 8 to 36 months (Smoczyńska et al., 2015). We assigned Polish CDI items the scores of the following meaning-based word properties: concreteness, association with babies, arousal, and valence. Following the methods of Braginsky et al. (2019), we used datasets available from previous studies with adults (Brysbaert et al., 2014; Perry et al., 2015; Warriner et al., 2013). In order to investigate the generalizability of the findings described by Braginsky et al. (2019), we fit a logistic regression model to the item-level data from the Polish CDI norming study with predictors including meaning-based factors and frequency in Polish Child-Directed Speech (Haman et al., 2011). This poster presents the necessary steps and results of the analyses applied to Polish CDI data, as well as discusses future steps: analyses of other possible predictors, and collecting data from native speakers of Polish on various properties of all CDI items. This study will allow us to investigate the predictors of early word learning specific to Polish and in comparison to the languages studied by Braginsky et al. (2019).

[PS-2.38]

The semantic interference in 9- to 36- month-olds: An at-home eye-tracking study on infants lexical abilities

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The present study adapted the well-established Looking-While-Listening paradigm [Fernald et al. 2008] to measure semantic interference in 9- to 30-month-old infants (N = 30). We took advantage of cutting-edge technology to remotely collect eye-tracking data. Moreover, we used standardized vocabulary size checklists [Caselli, et al; 2015] and Socio-Economic-Status indexes to finely describe our sample. In a 2 x 2 repeated measures design, we continuously collected data in a task with 3 phases. First, the PRE-LABEL phase showed two images that could or could not belong to the same semantic category (e.g., dog-sheep or sheep-apple). In the LABEL PHASE, a voice named one of the two images, then, in the POST LABEL PHASE the two images remained visible up to 2 seconds. We measured (i) the accuracy in the referent selection, (ii) the proportion of fixations on the referent / distractor, and (iii) the latency of the first saccade towards the referent. The agreement between the automatic and the manual frame-by-frame coding - made by 3 independent experimenters - showed high plausibility (Fleiss' kappa = 0.8). Of note, by treating age as a continuous measure, we observed an increase in the semantic interference effect from 9 to 36 months. Specifically, the results indicate that the semantic distractor impacts the selection of the referent starting from 18-months and continues later in language development. We contribute with theoretical and methodological insights of use for language and attentional development scientists, especially those interested in lexical and visual-spatial dynamics. We stress the importance of using complementary measures of early attention and lexical abilities as a preferential gate to a broad picture of infants' language development.

[PS-2.39]

Using eye tracking to better understand children's processing of events during verb learning: Is the focus on people (faces) or their actions (hands)?

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Verbs are central to the syntactic structure of sentences. A controversy in verb learning is whether children focus on the agent of the action (Maguire et al., 2008; Childers et al., 2017) or the action being performed (e.g., Behrend, 1990). Additionally, most verb studies only include relevant events, while in everyday contexts children also need to ignore irrelevant events. This study examines children's verb learning using an eye tracker to track participants' looking to the agent's face and hands to better understand children's visual attention. Two 1/2, 3 1/2- and 4 1/2-year-olds saw dynamic relevant and irrelevant scenes and heard new verbs while a Tobii x30 eye tracker recorded eye movements to head and hands AOIs (see Fig. 1). We predicted that children should look more at the actor's hands than the actor's face when viewing relevant events, as a focus on hands is more useful in verb learning. Results show that children in all age groups were able to learn and extend new verbs to new scenes at test. Additionally, across age groups, when viewing relevant events, children increased their looking to the hands (where the action is taking place) as relevant trials progressed and decreased their looking to the agents' face, which is less informative for learning a new verb's meaning (see Fig. 2). In contrast, when viewing irrelevant, distracting events, children decreased their looking to hands over trials and maintained their attention to the face (see Fig. 3). In sum, children's visual attention to agents' faces and hands differed depending on whether the events were linked to a new verb. These results are important as this is the first study to show this pattern of visual attention during verb learning, and thus these results may help reveal underlying attentional strategies children use when learning verbs.

[PS-2.40]

Vocabulary composition in early lexical development of Croatian speaking two-year-old children

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It is well known from several language development studies in Croatian that since the beginning of lexical development there has been a prevalence of nouns in children's vocabulary (Jelaska & Kovačević, 2001), confirming the hypothesis of noun predominance in the early lexicon (Bornstein et al., 2004; Rescorla et al., 2001; 2013). These empirical data further raise questions about the vocabulary composition of two-year-olds who speak Croatian.

Accordingly, this study analyzed the vocabulary composition of Croatian-speaking children aged 22-30 months whose parents reported about their early lexical development. The aim is two-fold: To determine the ratio of different word types in the expressive lexicon of children aged 22-30 months; Regarding the nouns, to determine which are specific and dominant semantic categories in the early expressive lexicon of two-year-olds. The data of children (N=241) aged 22-30 months will be analyzed. Information on early expressive lexicon was collected using the MacArthur-Bates Communicative Development Inventories. The MB-CDIs were fulfilled by the parents. Preliminary data confirm that nouns are more significantly represented (60%) in the vocabulary of two-year-olds, concerning other word types (verbs, adjectives). By analyzing the predominance of specific word (semantic) categories (of 12 categories included in the analysis) among nouns, significant differences have been found in the representation of semantic categories: Food & Drinks, followed by Animals and Small household items with respect to other categories were found as word categories of the highest frequency in the lexicon of Croatian two-year-olds. Presuming that children are exposed to these objects dominantly and are part of their daily communication routines can explain such findings.

[PS-2.41]

Language resources, language choices, and translanguaging in parent/child interactions in Singapore

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How do parents in a diverse multilingual environment use their different languages when talking with their preschoolers. The Talk Together Study is a large-scale micro-longitudinal study on child-directed speech in Singapore, conducted in three videocall recording sessions, over 4-6 months.

Participants. 147 families with children ranging from 8 months to 4 years of age took part in the study. In line with local demographics, the majority of caregivers reported being bi- or multilingual (Singapore Census, 2020). Participant retention (92%) resulted in 410 parent-child storybook recordings. Methods. Recruitment began in 2020 when many families were at home with their children (Woon et al., 2021). After completing a set of surveys, parents joined a videocall with their child, and narrated an onscreen version of a wordless picturebook 'What a Scary Storm!' (Styles, 2020). Before starting the task, parents were reminded they could share the story in any language, including a mix of languages. Each video is annotated by a team of trained research assistants using ELAN conventions designed for multilingual language labeling and transcription. All annotations were checked by a second transcriber. Results & Progress. Despite high rates of self-reported bi-/multilingualism, few parents reported using all of their languages when talking with their children, and we aim to compare these self-reports with language use in the recorded calls. At the time of abstract submission, 269 transcriptions have been completed, with transcriptions projected to conclude in Autumn 2022. Discussion. The current paper will present a summary of the proportion of time each parent spends using each of their languages with their child, and how their behaviour in the storytelling task relates to their self-reported language skills, and family language plans.

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