The 5th Annual International Language and Communicative Development Conference

12-13 June 2019
Chancellors Hotel
Manchester

TALKS

Day 1, Wednesday 12th June 2019

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The ESRC International Centre for Language and Communicative Development

KEYNOTE 1

Language acquisition as skill learning: The development of real-time processing

Bob McMurray
University of Iowa

A fundamental property of language is ambiguity –phonetic categories are rife with variability and overlap, words have multiple meanings, and syntactic phrases can play multiple roles in a sentence. Thus, even skilled language user must use sophisticated real-time processes to interpret language in the moment. Typical approaches to language acquisition have focused largely on representation – how do children acquire the words, categories and structure of language? This had led to sophisticated theories of learning, but it has led to a crucial theoretical gap –how do these real-time processes develop? This presentation begins to address this issue in a variety of domains. I discuss recent research from my lab and others on word learning and spoken word recognition that speaks to the interaction of real-time and developmental time processes. This work shows how real-time lexical processing develops, and how this may relate to the process of learning new words, and how it may relate to language disorders. As a whole this work suggests that the development of real-time processing is more complex than simple changes in speed of processing or executive function, but rather may derive from changes in the language processing system, and in broader aspects of neural development.

SESSION 1: INFANCY

Investigating Infant Social Cognition using ERPs: Insights on Communication, Theory of Mind and semantic comprehension

Eugenio Parise[1], Louah Sirri[2], Szilvia Linnert[1], Vincent Reid[1]

1. Lancaster University; 2. Manchester Metropolitan University

Human infants manifest sophisticated cognitive mechanisms to perceive, recognize and understand the world, both in the physical and in the social domain (Csibra & Gergely, 2009). Here I will present two studies on infant social cognition using EEG/ERPs.

I will show that 4-month-olds are sensitive to adults' communicative signals such as Infant Directed Speech (IDS). Infants interpret IDS like a communicative signal directed to them, and when they are provided with a human face they allocate more perceptual resources to process it. This effect is specific to faces and it cannot be interpreted as a mere enhancement of attention. Young infants are likely looking for communicative partners, rather than social signals per se.

Then, at 14 months, infants can use Theory of Mind skills to track the semantic comprehension of their communicative partners in a social N400 paradigm. The results show clear signs of false beliefs tracking.

The importance of being variable

Padraic Monaghan[1,2], James Brand[3], Kirsty Dunn[2], Rebecca Frost[4]

1. University of Amsterdam; 2. Lancaster University; 3. University of Canterbury; 4. MPI Nijmegen;

For learning language, children are supported by multiple cues in the environment, including co-occurrences between spoken forms and referents, distributional cues expressed in the syntactic constraints of utterances, prosody in speech, and communicative gestures highlighting intended reference and referents. Individual cues are known to aid learning, but such cues are enormously noisy and variable in the child's language learning environment. How do children cope with this variability? In WP4, in a series of computational models and experimental studies of word learning we investigated the extent to which learners cope with this variability in multiple cues. The results demonstrate that variability is not only beneficial, but may even be essential, for language learning.

Modelling the interaction between auditory labels and attentional focus

Arthur Capelier-Mourguy[1], Katie Twomey[2] and Gert Westermann[1]

1. Lancaster University; 2. University of Manchester

How labels relate to perceptual features of objects in category learning has been discussed controversially. According to one view labels have the same status as other features and become integrated into the object representation. Another view holds that labels are separate from object features and thereby shape object representations. Here we extended a previous computational model of object categorisation to model different ways in which labels can affect attention to object features during category learning. Specifically, we were interested in how object labels can direct learners' attention to diagnostic features of low saliency. Attention was modelled as modulation of learning rates of attended-to features. We discuss how changes in attention affect resulting object representation and the implications of these processes for the theories of the status of object labels in categorization.

How do infants' early holdout, give, point and reach gestures influence caregiver feedback during social interaction?

Laura Boundy, Thea Cameron-Faulkner and Anna Theakston

University of Manchester

Infants' pre-linguistic gestures help to facilitate interactions with a caregiver, which are an important mediator between gesture and language acquisition[i]. This study examined how different gestures predict the nature of an interaction, and caregiver input. Forty 11-month-olds were videotaped during naturalistic play with their caregiver. Interaction duration, number and type of caregiver utterances (e.g. labels, questions) to infants' points, reaches, holdouts and gives were coded. Type of gesture was found to be a significant predictor of interaction duration and number of utterances; holdouts and gives produced longer interactions and more caregiver utterances than points or reaches. Type of gesture was also a significant predictor of utterance type; points and reaches elicited more object labels, gives produced more interjections, and holdouts more action descriptions. These findings explain some of the developmental patterns of pre-linguistic gesture use and language, by highlighting different roles of each gesture within early interactions[ii].

[i] Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and sharing intentions: The origins of cultural cognition. *Behavioral and Brain Sciences*, *28*(5), 675-691.

[ii] Cameron-Faulkner, T., Theakston, A., Lieven, E., & Tomasello, M. (2015). The relationship between infant holdout and gives, and pointing. *Infancy*, *20*(5), 576-586.

A cross cultural analysis of early prelinguistic gesture development and its relationship to language development

Thea Cameron-Faulkner[1], Nivedita Malik[1], Circle Steele[1], Stefano Coretta[1], Ludovica Serratrice[2], Elena Lieven[1]

1. University of Manchester; 2. University of Reading

Many Western industrialised nations have high levels of ethnic diversity but to date there are very few studies which investigate prelinguistic and early language development in infants from ethnic minority backgrounds. The current study tracked the development of infant communicative gestures from 10-12 months (n=59) in three culturally distinct groups in the United Kingdom and measured their effect, along with maternal responsiveness, on vocabulary development at 12 and 18 months. Our findings do not show significant differences in the development of infant gestures and maternal responsiveness across the three cultural groups, but a significant positive association between gesture, maternal responsiveness and vocabulary development. In conclusion the study shows that caregivers across cultural groups interact in similar ways when asked to participate in a standardised task though cultural differences may be apparent in a more naturalistic context.

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KEYNOTE 2

Patterns in the input and their impact for language development

Sabine Stoll

University of Zurich

One of the great unresolved puzzles in language development is the role and the impact of child-directed speech. A major focus in this line of research has been on features that distinguish child-directed speech from other genres. Here I focus on input patterns that are potentially helpful for categorization. I first show in a case study of English causatives that meaning extraction in child-directed speech is supported by different features than meaning extraction in other genres such as adult conversations and written language. Second, I discuss cross-linguistic similarities in patterns of information distribution in child-directed speech. The focus is on structural patterns such as frequent frames, variation sets, and temporal features specific to nouns and verbs. I show that there are similarities in these patterns that cut across cultures and languages with maximally diverse grammatical design and I discuss their impact for learning.

SESSION 2: EARLY LANGUAGE

Newborn toolkit: Speech segmentation, speech memory

Perrine Brusini[1] and Alissa Ferry[2]
1. University of Liverpool; 2. University of Manchester

The question of how humans learn language, and if any aspects are innate, has fueled countless debates. Yet, few studies have investigated how newborns perceive and process language, as they are a particularly difficult population to test with traditional measures (e.g., looking times). Recent advances in neuroimaging have allowed for more flexibility in exploring these questions. Here we will present several studies using near-infrared spectroscopy (NIRS) to investigate how humans process language from the first days of life. We will show that newborns can use prosody and the co-occurrence of syllables to segment and remember words from long streams of speech, but they fail to use syllabic frequency as a cue. These findings suggest that humans are born with some specific biases that guide the processing of complex linguistic information and we will discuss their implications for our framework of understanding of language development.

What aspects of infants' prelinguistic communication are most valuable for learning to speak, and why? A new approach to weighing up predictive value over a hierarchy of behaviours.

Colin Bannard
University of Liverpool

The set of proposed prerequisites for language is ever expanding. Claims have been made for specific behaviours such as the syllable or the declarative point, cognitive abilities such as infants' developing intentional control over communication, and environmental factors such as caregiver responses to communicative acts. To date, studies have looked at the diverse factors in separate studies. This talk will describe new work (Donnellan et al., in press) which explores the predictive value of a comprehensive set of infant behaviours in longitudinal data, focusing on two particular challenges - the fact that a) the enormous number of predictors leads to a combinatorial explosion of possible models, and b) many of these behaviours are closely related, being collinear with or nested within one another. It will describe how we meet these challenges using multi-model inference over a hierarchy of predictors – allowing a unified account of the emergence of conventional communication.

Donnellan, E., Bannard, C., McGillion, M., Slocombe, K., & Matthews, D. (in press). Infants' intentionally communicative vocalisations elicit responses from caregivers and are the best predictors of the transition to language: a longitudinal investigation of infants' vocalisations, gestures, and word production. Developmental Science.

Avoiding overgeneralization errors across languages: The Crosslinguistic Acquisition of Sentence Structure (CLASS) Project

Ben Ambridge[1], Laura Doherty[1], Ramya Maitreyee[1], Colin Bannard[1], Stewart McCauley[1], Ayuno Kawakami[1], Soumitra Samant[1], Inbal Arnon[2], Ruth Berman[3], Shira Zicherman[2], Dani Bekman[2], Amir Efrati[2], Bhuvana Narasimhan[4], Rukmini Bhaya Nair[5], Dipti Misra Sharma[6], Kumiko Fukumura[7], Tomoko Tatsumi[8], Seth Campbell[9], Motoki Saito[10], Clifton L. Pye[11], Pedro Mateo[12] Pedro[12], Sindy Fabiola Can Pixabaj[12], Mario Marroquin Peliz[12], Magarita Julajuj Mendoza[12]

1. University of Liverpool; 2. Hebrew University of Jerusalem; 3. Tel Aviv University; 4. University of Colorado, Boulder; 5. Indian Institute of Technology, Delhi; 6. Indian Institute of Information Technology, Hyderabad; 7. University of Strathclyde; 8. Kobe University; 9. University of Calgary; 10. University of Tübingen; 11. University of Kansas; 12. Universidad del Valle de Guatemala

A central question in language acquisition research is how children acquire the abstract generalizations that allow them to produce novel sentences, while avoiding the ungrammatical utterances that result from across-the-board application of these generalizations (e.g., **The clown laughed the man*; c.f., *The clown made the man laugh*). Previous theories (the entrenchment, preemption and verb semantics hypotheses) have enjoyed some success for English (e.g., Ambridge et al, 2018; Perek & Goldberg, 2017), but remain largely untested for other languages. In this talk, I present the findings from a combined corpus, experimental and computational-modelling project designed to answer this question looking across five languages — English, Hebrew, Hindi, Japanese and K'iche' Mayan — and three age groups (5-6, 9-10 and adults).

How the input shapes the acquisition of verb and noun morphology cross-linguistically

Joanna Kolak[1], Felix Engelmann[2], Sonia Granlund[3], Virve Vihman[4], Marta Szreder[5], Ben Ambridge[3], Julian Pine[3], Anna Theakston[2], Elena Lieven[2]

1. Salford University; 2. University of Manchester; 3. University of Liverpool; 4. University of Tartu; 5. United Arab Emirates University;

Understanding how children acquire inflectional morphology requires a cross-linguistic approach, as the well-studied English system is sparse and difficult to scale up to languages with more complex morphology.

This talk reviews results from experiments and modelling conducted in work packages 6, 11 and 13. We investigated the development of verb morphology in two highly inflected languages, Polish and Finnish, using elicited production with children aged 3-4, and neural network models (Engelmann et al., 2019). We also tested 3-4-year-olds' production of noun inflection in Polish, Finnish and Estonian (Granlund et al., 2019), and compared those results with neural networks. Finally, we investigated the ability of 3-7-year-olds to use word order and case cues to identify semantic roles in transitive sentences in those three languages. We found pervasive effects of input token frequency and phonological neighbourhood density. We will discuss the role of input for the acquisition of complex morphology.

TALKS

Day 2, Thursday 13 June 2019

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KEYNOTE 3

Predictive processing in a less predictable world

Arielle Borovsky
Purdue University

Although researchers often explore how predictive mechanisms support language processing in well known (i.e. predictable) contexts, a great deal of communication conveys novel (i.e. less predictable) information. Similarly, children, who are simultaneously learning about language and the world, may experience enhanced uncertainty during language processing. Given the ubiquity of uncertainty during everyday language processing, to what extent can we rely on prediction as a plausible and central mechanism in language processing across development?
I explore this tension between predictive processing and uncertainty in several studies that measure whether and how adult and child listeners deploy predictive mechanisms while learning about new events. Together, these studies paint a broad picture that flexibility in predictive processing develops over a protracted developmental period. I will argue that by incorporating developmental insights and learning paradigms into studies of linguistic prediction, we can develop more nuanced models of how and when prediction supports everyday communication and learning.

SESSION 3: MODELLING AND PREDICTION

Simulating the acquisition of verb inflection in typically developing children and children with Developmental Language Disorder in English and Spanish

Daniel Freudenthal[1], Michael Ramscar[2], Laurence B. Leonard[3] and Julian Pine[1]

1. University of Liverpool; 2. University of Tübingen; 3. Purdue University

We present data suggesting that typical and impaired acquisition of verb inflection in English and Spanish reflect an interaction between input statistics and children's ability to learn sequential information. We train a sequence-learning model on stimuli reflecting the statistics and word order of English and Spanish, and show that degrading the model's ability to associate verb inflections with cues occurring earlier in time leads to greater delays in the acquisition of verb inflection in English. We relate this difference to the impoverished nature of English verb inflection resulting in the bare form acting as a default, and the fact that question-formation in English (but not Spanish) results in bare forms frequently occurring in third-singular contexts. Finally, we hypothesize that the pro-drop nature of Spanish makes it easier to associate person and number cues with the verb inflection than in English, where inflection needs to be integrated with the overt subject.

How Does Caregiver Naming Behaviour Influence the Origins of Lexical Development?

Jill Lany[1], Abbie Thompson[2] and Ariel Aguero[2]

[1]University of Liverpool; [2]University of Notre Dame

Words have a strong effect on cognition before infants know their specific meanings. For example, 3-month-olds benefit from the presence of words (but not tones) when forming visual categories. This suggests that words play a formative role in object cognition, and that an early link between words and categories sets the stage for learning symbolic relations. But where does this link come from? We tested whether structure in infants' environment can foster this effect. Caregivers often use exaggerated "showing" gestures when labeling objects, presenting words in synchrony with object motion. This synchrony attracts infants' attention, and promotes the unification of inputs from different modalities while reducing encoding of modality-specific features. In two experiments we found that word-object synchrony impacts infants' object encoding, and that it enhances subsequent categorization in the presence of words. Thus, structure in infants' environment may contribute to the special effects that words have on categorization.

Multiword Units Shape Children's Non-inversion Errors in *Wh*-question Formation: "What Corpus Data Can Tell Us?"

Stewart McCauley[1], Colin Bannard[1], Anna Theakston[2], Michelle Davis[2], Thea Cameron-Faulkner[2], & Ben Ambridge[1]

1. University of Liverpool; 2. University of Manchester

Subject-auxiliary inversion in interrogatives has been a topic of great interest in language acquisition research, and has often been held up as evidence for the structure-dependence of grammar. Usage-based and nativist approaches posit different representations and processes underlying children's question formation and therefore predict different causes for these errors. Here, we explore the question of whether input statistics predict children's spontaneous non-inversion errors with *wh*- questions. In contrast to previous studies, we look at properties of the non-inverted, errorful forms of questions. Through a series of corpus analyses, we show that the frequency of uninverted subsequences (e.g., "*she is going*" in "*what she is going to do*?*") is a good predictor of children's errors, consistent with recent evidence for multiword units in children's comprehension and production. This finding has implications for the types of mental representations and cognitive processes researchers ascribe to children acquiring a first language.

Visual sequence learning and language development: Evidence for a domain-general learning mechanism?

Michelle Peter[2], Amy Bidgood[3], Samantha Durrant[2], Julian Pine[2] and Caroline Rowland[1,2,4]

1. Max Planck Institute for Psycholinguistics; 2. University of Liverpool; 3. University of Salford; 4. Radboud University;

An important question concerns whether the mechanism involved in language acquisition is common to other cognitive processes. The present work explored the possibility of domain-generality of the learning mechanism by examining whether early visual sequence learning is related to language development.

We used a habituation task (Kirkham et al., 2006) and a visual expectancy task (Ellis et al., 2013) to assess the visual sequence learning ability of children from the Language 0-5 Project (n = 76, mean age = 12;10), and compared their performance on these tasks to their concurrent and later vocabulary (UK-CDI/Lincoln CDI) and syntax scores (M3L; Lincoln CDI).

In keeping with Kirkham et al., children discriminated between different sequences. Performance on this task also predicted receptive vocabulary at 18 and 24 months. No relationship, however, was found between visual expectancy performance and vocabulary across the second year, or between performance on either task and later syntax. The implications of these findings will be discussed.

The relationship between prediction in sentence processing and language development.

Samantha Durrant[1], Michelle Peter[1,] Amy Bidgood[3], Julian Pine[1] and Caroline Rowland[1,2,4]

1. University of Liverpool; 2. Max Planck Institute for Psycholinguistics;
3.University of Salford; 4. Radboud University;

Understanding spoken language requires rapid online processing of the auditory signal, which is facilitated by the fact that, when hearing sentences, listeners use the information in the sentence to predict upcoming content. For example, Mani and Huettig (2012) reported prediction of a target following a constraining verb (e.g. 'eats' predicts 'cake' but not 'horse') as did Borovsky et al. (2012), in a harder task where prediction depends on the integration of information from subject and verb of the sentence.

We tested the Language05 Project participants in both tasks (at 37, 43 and 49 months) to determine if individual differences in the two tasks are related to each other and whether a child's ability to predict upcoming information is related to their later language abilities (tested via the BPVS and CELF). These data are currently being analysed and will be presented at the conference.

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KEYNOTE 4

Preschoolers' decontextualized language experience and their later language development

Meredith L. Rowe
Harvard Graduate School of Education

This talk will focus on preschool-aged children's exposure to and experience with decontextualized language, or talk that is about abstract topics removed from the here and now. I will show how parents' use of decontextualized language increases across children's early years of development, how parents' use of decontextualized language is associated with children's use, and how children's use of this type of language as preschoolers predicts their kindergarten oral language skills, and their academic language skills in early adolescence. Finally, I will briefly mention results of a small-scale parent intervention to increase parents' and children's use of decontextualized language at home.

SESSION 4: LATER LANGUAGE

Does caregiver speech influence children's acquisition of modality?

Kimberley Bell[1], Silke Brandt[2], Elena Lieven[1] and Anna Theakston[1]

1. University of Manchester; 2. Lancaster University

Modal verbs such as *can, must*, and *may* are difficult for children to learn as one form, e.g. *can* may be associated with multiple meanings, i.e. physical ability, permission, suggestion. Despite this, limited research has focused on children's production of these forms (Fletcher, 1985) and there has been even more limited focus on caregiver input and the modal verbs children are exposed to. To investigate this, we examined the properties of modal use addressed to two young children between 3-5 years of age using dense naturalistic input samples. Modals were analysed according to their frequency and their associated meanings. Strong positive correlations were found between the frequency of use of modal forms within each parent-child dyad, but also of specific form-meaning mappings with those modals. Preliminary results suggest that the number of meanings associated with a modal in the input, and their distribution, affect the order of acquisition.

Fletcher, P. (1985). A Child's Learning of English. Oxford: Basil Blackwell Publisher Ltd.

Does children's understanding of causal and conditional sentences vary with pragmatic function?

Heather Lemen, Anna Theakston, Elena Lieven

University of Manchester

In Content causal (e.g. because) or conditional (e.g. if) sentences, subordinate clauses describe true causes or sufficient conditions for events/states; in Speech-Act sentences, subordinate clauses justify a speech act (causal) or define conditions for a speech act (conditional) (Sweetser, 1990). Although young children hear and produce both Content and Speech-Act because- and if-sentences frequently (e.g. De Ruiter et al., in prep.), previous research has primarily focused only on comprehension of Content sentences (e.g. De Ruiter et al., 2018).

Using a forced-choice paradigm, we tested 93 3-5 year-old children's comprehension of both Content and Speech-Act because- and if-sentences. Results showed children were more accurate with if-sentences, 3-year-old girls performed significantly better than 3-year-old boys and girls performed better with if-Content. Comparatively, adults had significantly slower response times with Speech-Act sentences. Findings will be discussed in relation to production patterns and cognitive demands associated with the different pragmatic types (e.g. Zufferey, 2010).

De Ruiter, L. E., Theakston, A. L., Brandt, S., & Lieven, E. V. (2018). Iconicity affects children's comprehension of complex sentences: The role of semantics, clause order, input and individual differences. Cognition, 171, 202-224.

De Ruiter, L. E., Lemen, H. C. P., Theakston, A. L., Brandt, S., & Lieven, E. V. (in prep). Corpus study on children's acquisition of complex sentences (title to be confirmed).

Sweetser, E. (1990). From Etymology to Pragmatics: Metaphorical and Cultural Aspects of Semantic Structure (Cambridge Studies in Linguistics). Cambridge: Cambridge University Press.

Zufferey, S., Mak, W. M., & Sanders, T. J. (2015). A cross-linguistic perspective on the acquisition of causal connectives and relations. International Review of Pragmatics, 7(1), 22-39.

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Discourse and morphosyntactic effects on children and adults' online processing of relative clauses

Ross Macdonald[1], Silke Brandt[2], Anna Theakston[1], Elena Lieven[1] and Ludovica Serratrice[3]
1. University of Manchester; 2. Lancaster University; 3. University of Reading

Relative clauses (RCs) are challenging for young listeners. We investigated discourse effects on RC-interpretation using ambiguous RCs and preamble sentences with no direct reference to the agents in the target sentence. For example, "The man saw the nurse [NP1] with the boy [NP2] *who was tired*" was employed after one of these preambles:

"It was a long day…
(1)…at the hospital" [NP1-priming]
(2)…at the school" [NP2-priming]
(3)…that Tuesday" [Neutral]

Adults and children saw pictures of NP1 and NP2 as they listened, while we monitored eye-movements. We found not discourse effects, but participants showed anticipation for NP2, suggesting syntax guided processing. We varied morphosyntactic cues ("The man saw the nurse(s) with the boy(s) *who was/were tired*") with adults and found these cues influenced online interpretation with interference from syntax but not discourse. We are testing children with these stimuli to investigate the influence of morphology, syntax and discourse on RC processing.

Thinking and communicating about mental states: Two experiments with English 2-and-3-year-olds

Ditte Boeg Thomsen[1], Birsu Kandemirci[1], Anna Theakston[2] & Silke Brandt[1]
1. Lancaster University; 2. University of Manchester

During the pre-school years, children start to reason flexibly about mental states, and this sociocognitive development appears to be tightly related to acquiring complement clauses (e.g., *he says [it's an apple]*) and mental verbs (e.g., *think*) (cf. Astington & Baird, 2005). To examine direction of causality in this relationship and compare the effectiveness of different linguistic tools, we conducted a longitudinal study and a training study with English-speaking 2-and-3-year-olds. In the longitudinal study (N=45), we found that mastery of complement clauses and mental-state verbs around three years predicted variance in false-belief reasoning six months later. In the training study (N=81, eight sessions), children had situations with mental-state contrasts explicated linguistically with either simple clauses or complements. Children trained with complements advanced more in false-belief reasoning than children trained with simple clauses, and especially children with poor pretest complements proficiency benefitted from training with this perspective-marking construction.

Astington, J. W. & J. A. Baird. 2005. *Why language matters for a theory of mind*. Oxford, UK: Oxford University Press.

POSTERS

Day 1, Wednesday 12th June 2019

1. “I don’t know but I know who to ask”: 12-month-olds actively seek information from knowledgeable adults

Marina Bazhydai, Gert Westermann and Eugenio Parise
Lancaster University

Active social communication is one of the effective ways for infants to learn about the world. The present research investigated whether 12-month-olds selectively seek information from more knowledgeable adults in situations of uncertainty. In a laboratory experiment, infants were introduced to two unfamiliar adults, an Informant (reliably labeling objects) and a Non-Informant (equally socially engaging, but ignorant about object labels). At test, infants were asked to locate a novel referent among two novel objects. In such situation of high referential uncertainty, infants selectively looked to the Informant rather than the Non-Informant, but showed no such preference at the familiarization and training phases, when no uncertainty (and no need to ask for information) was present. Results suggest that preverbal infants generate social looks to actively and selectively seek information from more knowledgeable others, prior to their active use of pointing or ability to pose questions, as part of the interrogative communicative toolkit.

2. Baby Sign, mental-state terms and language development

Amy Bidgood[1], Elizabeth Kirk[2], Samantha Durrant[3], Michelle Peter[3], Julian Pine[3] and Caroline Rowland[3,4,5]

1. Salford University; 2.Anglia Ruskin University; 3.University of Liverpool; 4. Radboud University; 5. Max Planck Institute for Psycholinguistics

Baby sign is an increasingly popular activity amongst parents and their pre-verbal infants. Companies promoting it claim it has many benefits, including improving language development. If this is true, one possible mechanism could be through enhancing mother-child interactions: if baby-signing mothers perceive their infants as being capable of intentional communication earlier than non-signing mothers, they might be more likely to acknowledge their child’s deictic gestures (e.g. points, reaches), and respond more contingently, perhaps providing more mental-state terms (e.g. want, like) in response.

Analysis of the interaction of mother-child dyads (N = 46, 23 baby-signers) when the children were aged 11 and 12 months showed baby-signing babies do not produce more deictic gestures than non-signers, nor do their mothers respond more contingently, and their vocabulary development is no faster. However, baby-signing mothers respond using more mental-state terms, suggesting they could be perceiving their infants as volitional agents earlier in development.

3. Exploring the relationship between socio-economic status, language exposure, and sentence processing in young adults

Jessica Brown, Lorna G. Hamilton, Jelena Mirković
School of Psychological and Social Sciences, York St John University, UK

The influence of socio-economic status (SES) on language development in childhood has been shown to be partially mediated by spoken and written language exposure (e.g. Hoff, 2003). Language exposure is key for developing vocabulary knowledge, as well as comprehending and producing more complex language. The current study examines the role of SES and language exposure and the extent to which these variables influence language skill beyond childhood.

Across two studies, 302 young adults (Mean age = 20.73 years) participated in tasks measuring SES, written and spoken language exposure, and language comprehension and production across domains (e.g., word-level, sentence-level; offline, and real-time processing). Measures of SES were not found to significantly relate to language exposure or language skill in this sample. However, a relationship was found between language exposure and language skill, including sentence comprehension ability and vocabulary knowledge. These findings will be discussed in the context of theories of language development through the lifespan.

4. The Impact of Parents' Smartphone Use on Object Learning in 9-month-old Infants: A Dual Head-mounted Eye-tracking Study

Chen, X.Y.,[1], Ke, H.,[2] Michel, C.,[3] Wong, K.Y.,[1] & Westermann, G.[1]

[1] Lancaster University; [2] Nanyang Technological University; [3] Max Planck Institute for Human Cognitive and Brain Sciences

New digital technologies such as iPads and smartphones are revolutionizing family life as well as parenting styles. Here we aim to explore the phenomena of parenting styles influenced by smartphones in the digital era. We asked mothers to look at a smartphone to avoid establishing eye contact during an interaction with their baby using dual head-mounted eye trackers. Previous studies highlighted the influence of mutual gaze as part of joint attention situations on the processing of novel objects, which suggested that joint attention facilitates object encoding in 9-month infants (Cleveland, Schug, & Striano, 2007; Cleveland & Striano, 2007). Here we examined the effect of mutual gaze on object learning in 9-month-old infants in a smartphone using situation during the infant-parent interaction.

Based on a wide range of literature that JA situations set the infant into a receptive state for novel information (natural pedagogy: Csibra & Gergely, 2006; Cleveland, Schug, & Striano, 2007; Cleveland & Striano, 2007), we expect that infants' performance in recognizing familiar objects would be better in JA condition than in SM condition.

5. Frequency over Association in Noun Acquisition of Balinese Children

I Made Sena Darmasetiyawan
University of Liverpool

In the study of first language acquisition, early acquisition does not reach syntactic level yet. Word production can be investigated through frequency effect of repetition and imitation, along with association of representative meaning. It has been pointed out that nouns are acquired earlier than verbs. At least from the construction approach, frequency seems to be an important factor in children's acquisition of lexical forms such as nouns. This study highlights the frequency effect when compared to meaning association in the acquisition of lexical forms by Balinese children.

This study employed experimental method of an instrument that added with purposive sampling of the children recording data. The method involved five Balinese children of toddler level in their parents-child interaction that exposes them to several languages use. The results show that most Balinese children acquire nouns that relatively closer to their personal interests, as well as frequent nouns spoken by their parents.

6. Do adults learn from their mistakes? Evaluating error-based theories of language acquisition

Judit Fazekas[1], Andrew Jessop[2], Julian Pine[1], Caroline Rowland[1,2]
[1] University of Liverpool; [2] Max Planck Institute for Psycholinguistics

While the role of prediction in language processing has been widely discussed, its contribution to language acquisition has yet to be determined. Error-based theories of language acquisition suggest that children continuously make and evaluate predictions in order to reach adult-like language use, a learning mechanism that continues to be active in adulthood. We carried out a four-phase prime surprisal study with 72 adult participants to assess the main implication of these theories: that surprising input leads to more lasting language change than predictable input. We are currently processing the data resulting from this study; the results will be presented with regards to the following predictions:

1. We will assess whether input predictability led to changes in immediate linguistic production as seen in previous studies.

2. We will determine whether input predictability also led to lasting changes in linguistic representations, which is a not-yet-assessed but crucial implication of error-based learning theories.

7. Can young children explain why their partners' beliefs are false?

Kirsty Hartwell, Anna Theakston and Bahar Koymen
University of Manchester

In collaborative problem solving, speakers compare reasons for their proposals (e.g. direct evidence outdoes indirect evidence). This study investigates whether 3- and 5- year old children can provide reasons to their partner, when their partner has a justified false belief.

An experimenter (E1) introduced a toy that left traces. A child and another experimenter (E2) had to jointly decide in which of three houses the toy was hiding. In the experimental condition, E1 moved the toy to a new house, meaning E2 had a false belief of the toy's location. The child then had to convince E2 that her belief was now incorrect. In the control condition, E1 moved the toy out, then back to its original house. Therefore, E2's belief remained correct.

Data collection is currently ongoing, however we predict that both age groups will try to convince E2 more in the experimental condition than in the control condition.

8. Grammatical Generalisation in Statistical Learning: Is it implicit and invariant across development?

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The learning and generalisation of grammatical regularities is fundamental to successful language acquisition and use. Research into statistical learning has started to consider how this process happens through the implicit detection and assimilation of grammatical regularities. This study focuses on how adults and children generalise regularities and explored the role of explicit knowledge in this process. Across three experiments, adults and children learnt an artificial language containing two semantic categories denoted by a co-occurring determiner and suffix. Explicit knowledge of the regularities was associated with generalisation performance in adults but not children, even when adult word level knowledge was similar to children's. The implications of these results on developmental theories of grammatical generalisation are presented.

9. Individual differences in productive vocabulary: Identifying toddlers who are slow to talk

Lana Jago[1], Samantha Durrant[1], Michelle Peter[1], Amy Bidgood[2], Julian Pine[1] and Caroline Rowland[1,3,4]

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In this study, we used our knowledge of individual differences in productive vocabulary development to better understand delays in vocabulary acquisition. The aims of this study were to identify predictors of individual differences in productive vocabulary at 24 months and to investigate if these predictors could identify children who are slow to talk. Participants for this study are from the Language 0-5 Project. The predictors included: child sex, family history of language delay, input, conversational turns, earlier measures of productive and receptive vocabulary, mean length of utterances (MLU), speed of linguistic processing and non-word repetition (NWR). Five factors - conversational turns, earlier receptive vocabulary scores, MLU, speed of processing and NWR - explained unique variance in individual differences productive vocabulary scores after controlling for sex and earlier productive vocabulary. These factors were also successful in distinguishing between children who are and are not slow to talk.

10. The Role of Source Monitoring and Evidential Markers on Turkish and British Children's False-Belief Understanding: A cross-linguistic study

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In this study, we are interested in the factors that support children's false-belief understanding (FBU) and how these might compare in two structurally different languages, Turkish and English. Specifically we are investigating children's source monitoring abilities (SMA), and evidentials use in Turkish. No study to date investigated the relationship between FBU, SMA and evidentials use in children cross-linguistically.

Participants (aged between 3;6 and 4;11 years) complete three explicit false-belief tasks, two evidentials tasks, and one SMA task. As control variables we use one standardised language test and one memory task.

Fifty participants from each language will participate (sample size decided using a simulation-based power analysis in R) and the data collection will be completed in June 2019. The study is pre-registered using AsPredicted form. Data will be analysed using linear mixed effects models. The results will give a comprehensive understanding of the predictors of Turkish and English children's FBU performance.

11. The Role of Shape Bias in 'Online' and 'Offline' Categorisation in Autism

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From around 24-months-old, children develop a tendency to categorise objects by shape over other perceptual features during word learning, known as the shape bias. This bias appears to be a powerful tool that allows children to learn new words faster and make generalisations from a single example. Recent evidence suggests some children with Autism Spectrum Disorders (ASD) may not use shape as a preferred cue to category membership, which may affect the efficiency of word learning, however the relationship between this attentional bias and the ability to generalise labels to novel exemplars is not yet well understood.

For much experimental research into shape bias, both the new category exemplar and the test objects are visible at all times, allowing direct ('online') comparisons to be made. Whereas children's real-life category judgements are often made from internal representations ('offline'), without a known example present. To date there has been no research into how these different task types may affect word learning for children with ASD.

This poster presents two research studies: study 1) to investigate whether different task types influence the use of shape bias in word learning in typical and atypical development; study 2) to investigate underlying explanations for reduced shape bias in some children with ASD during word learning and categorisation.

12. Curiosity-based learning: a unique EEG signature of intermediate perceptual complexity

Szilvia Linnert and Gert Westermann
Lancaster University

According to curiosity-based models, learning occurs at intermediate levels of complexity, relative to existing mental representations. Low-level complexity does not stimulate significant learning, as similar information is already mentally represented, whereas overly complex information is difficult to integrate into existing representations. The aim of this study was to investigate processes underlying intermediate perceptual complexity using EEG in seventeen 9-month-old infants. The stimulus set consisted of nineteen colour images of novel animals, where attributes such as posture (stooping to standing) and shape of wing were varied incrementally. Images were presented successively, differing by either one, three or seven positions along the continuum; corresponding to small, intermediate or large levels of difference, respectively. Central ERPs between 350-450 ms were larger for intermediate differences compared to small or large differences. This indicates distinct attentional and/or encoding mechanisms when two images, presented consecutively differed at an intermediate level.

13. Comparing verb-marking errors in English-speaking children with Developmental Language Disorder and language-matched controls

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In this study we test two different models of the pattern of verb-marking error in 40 English-speaking children with DLD (3;0-5;6) and 48 language-matched controls (2;0-2;11) by eliciting verbs in simple-finite and compound-finite contexts. The Extended Optional Infinitive Hypothesis (Rice et al., 1995) predicts that children with DLD will perform worse than language-marched controls in both conditions. The Dual-Factor Model (Freudenthal et al., 2015) predicts that children with DLD will perform worse than language-matched controls, but only in the simple-finite condition. To test these predictions, the rates at which the children produced correct responses versus bare forms were entered into a 2x2 mixed ANOVA. The results showed a significant group x condition interaction ($F(1,64)=5.91$, $p=.018$), with the children with DLD performing worse than the controls in the simple-finite condition but better than the controls in the compound-finite condition. The implications of these results for the two models are discussed.

14. What are the research priorities for developmental language disorder? A collaborative approach

Lauren Longhurst
Royal College of Speech and Language Therapists

Developmental language disorder (DLD) is a term used to describe persistent difficulties with language development , not associated with a known biomedical condition, that create barriers to communication and/or learning in everyday life (RCSLT, 2017). It affects 7.58% of the population, yet is relatively unheard of (Norbury et al., 2016). Research in this area has been hindered by a lack of consistent terminology (Bishop et al., 2016).

The RCSLT is carrying out a research priority setting project for DLD (RCSLT, 2019). This involves mapping areas of uncertainty to current high-level research and generating areas of uncertainty through multi-stakeholder workshops, including children with DLD. A long list of research priority areas has been developed and a top 10 list of jointly agreed priories will be determined, following a prioritisation questionnaire. The top 10 list will be used to shape the future research agenda for DLD, leading to better outcomes for people with DLD and their families.

Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T. & CATALISE consortium (2016). CATALISE: A multinational and multidisciplinary Delphi consensus study. Identifying language impairments in children. PLoS ONE, 11(7), 1- 26.

Norbury, C. F., Gooch, D., Wray, C., Baird, G., Charman, T., Simonoff, E., Vamvakas, G. & Pickles, A. (2016). The impact of nonverbal ability on prevalence and clinical presentation of a language disorder: evidence from a population study. The Journal of Child Psychology and Psychiatry, 57(11), 1247- 1257.

Royal College of Speech and Language Therapists (RCSLT) (2019). Developmental language disorders research priorities. Available at: https://www.rcslt.org/members/research/research-priorities#section-4 [Accessed on 25 April 2019].

RCSLT (2017). RCSLT briefing paper on Language Disorder with a specific focus on Developmental Language Disorder. Available at: https://www.rcslt.org/members/clinical-guidance/developmental-language-disorder/developmental-language-disorder-learning#section-4 [Accessed on 25 April 2019].

15. The Effect of Object Novelty and Children's Age on Mother-Child Interactions.

Marina Loucaides[1], Katherine E. Twomey[2], Gert Westermann[1]
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One of the most prevalent ways in which children explore and learn is by interacting with social partners in object play, where children's learning input is impacted by their social partner's behaviour. In turn, the social partner's behaviour may be affected by the objects they and their child are exploring. This study included nine-month-old (n = 16) and 18-month-old (n = 16) children with their mothers to explore how object novelty affected mothers' behaviour during play. Object novelty affected mothers' interactive and non-interactive actions and infant directed speech (IDS) characteristics (number of words, pitch range, first utterance duration) while playing. Children's receptive vocabularies and mothers' educational level predicted mothers' actions and IDS. Mothers as social partners were found to influence children's experiences and learning input through their behaviours as they are influenced by object novelty at children's different developmental stages.

16. Word learning ability in children with Developmental Language disorder and the impact on later morphology and syntax development

Paula McLaughlin, Ben Ambridge and Julian Pine
University of Liverpool

Children with Developmental Language Disorder (DLD) have normal hearing and cognitive ability but struggle with language. The disorder affects around 7% of children in the UK. The underlying causes of DLD are not yet understood but in typically developing (TD) children there has shown to be a link between word learning and later grammatical development. This study investigates word learning ability of children with DLD and will consider the role of word learning in the development of morphology and syntax.

42 Children (12 DLD and 30 TD) were exposed to six novel nouns and six novel verbs via two short Pixar videos. Receptive and expressive word learning abilities in both groups were considered. Retention of the novel words after three days was also compared. Factors influencing word learning such as syllable length and receptive vocabulary are considered.

Data collection is ongoing. Preliminary results will be discussed.

17. The role of SES in parent-infant book reading and later language development

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Early onset of parent-child book reading is an important predictor of later language development (Debaryshe, 1993; Karrass & Baumgart-Rieker, 2005), in turn affecting reading and academic success (NICHD, 2005; Walker, Greenwood, Hart & Carta, 1994). However, few studies have examined parent-child book-reading interactions during the first year of life, and their relation to children's later language skills. In addition, little is known about the role of socioeconomic status (SES) in early book-reading interactions. We aimed to address these gaps in a longitudinal study of 44 parents of diverse SES and their 10-month-old typically developing infants. Mother-infant dyads were video-recorded during book reading at home, and their interactions transcribed and coded for maternal communication measures and infant interest. Maternal questions and infants' interest during early book reading (10 months) predicted later language development (18 months), and maternal education was not associated with maternal questions or infants' interest. Implications are discussed.

18. Is the automated classification of child gestures feasible?

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The production of gesture in infancy has been argued to be an important prerequisite for linguistic communication [2]. It has consequently been suggested that an individual child's tendency to produce particular gestures might be a useful predictor of their later language development. A system that is able to automatically identify gestures in video data could thus be a useful tool for research and clinical purposes. In this work, we use deep convolutional neural networks to classify 12 different child gestures observed in video data of natural interaction. We train and evaluate the model on hand-annotated videos of 72 children at 11&12 months of age [1] obtaining an average 46:29% classification accuracy. Child-specific scores for each gesture output by the system were rank correlated positively with the hand-coded rates of production (Give: r2 = 0:7, Hold out: r2 = 0:73, Point-Declarative: r2 = 0:77, and Share orientation: r2 = 0:42), as well as with their caregiver's judgements on the CDI. We will discuss what these results mean for the feasibility of the task and for its possible applications.

[1] Language05. https://osf.io/kau5f/.
[2] Michael Tomasello. Origins of human communication. MIT press, 2010.

19. New evidence for learning-based accounts of gaze following: Testing a robotic prediction

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Lancaster University

How gaze following emerges has been a topic of great debate. It is unknown whether infants are able to gaze follow only by understanding shared attention, or through low-level social reinforcement. Nagai et al. [Advanced Robotics, 20, 10 (2006)] successfully taught a robot to gaze follow purely through social reinforcement, and found that the robot learned to follow gaze in the horizontal plane before it learned to follow gaze in the vertical plane. In the current study, we tested whether 6- and 12-month-old infants were also better at gaze following in the horizontal than the vertical plane. We found that 12-month-old infants were only able to follow horizontal gaze above chance, whereas 6-month-old infants were at chance for both horizontal and vertical gaze. These results confirm a core prediction of the robot model, suggesting that children may also learn to gaze follow through reinforcement learning. This study was pre-registered, and all data, code, and materials are openly available on the Open Science Framework (https://osf.io/fqp8z/).

20. How context affects early language acquisition: An embodied model of early referent selection and word learning.

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Word learning is central to language acquisition. From 18 months, toddlers can disambiguate the referent of a novel label from an ambiguous array, and reinforce this label-object association over repeated encounters. However, the cognitive mechanisms underlying this ability are less well-understood. To explore these processes we simulated two studies of early word learning using the iCub robot, implementing word learning as a process of learning simple associations between visual and lexical input. Simulations captured the empirical results, and demonstrated that the context in which a to-be-learned object is encountered is critical. Our model offers an explicit account of the bottom-up associative and embodied mechanisms which support word learning, highlighting the importance of the micro-level dynamics that emerge from the interaction between the body and task context, making the prediction that the physical environment in which early learning events occur may have important consequences for language acquisition.

21. A form-based measure of phonological analogy in complex inflection paradigms

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Research suggests that inflected word forms can be produced by analogy with other similar forms, with high phonological neighbourhood density (PND) thus supporting accuracy in production. However, PND as it is commonly defined – on the basis of dictionary classes – is an inadequate proxy for phonological analogy in complex inflectional paradigms, especially when applied to early acquisition, as it involves criteria that go beyond phonology (e.g. semantics) and, potentially, beyond children's knowledge.

We propose an input-based measure of PND which defines neighbourhood with respect to each form on the basis of the transformations between base form and target.

We tested the new measure on elicited-production data and neural network simulations of noun case inflection in the morphologically complex languages Polish, Finnish and Estonian. Across studies, we found stronger and more reliable effects than with a class-based predictor, suggesting that the new measure provides a more adequate characterisation of phonological analogy.