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Developmental Psychology Section

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Abstracts

For detailed conference information, please visit:
www.bps.org.uk/dev2017

Keynote

Nurturing a lexical legacy: language experience and learning to read words

Professor Kate Nation, *University of Oxford*

The scientific study of reading has taught us much about the beginnings of reading in childhood. Similarly, there is a large evidence base charting the cognitive processes that characterise skilled word recognition in adults. Less understood is how children develop orthographic expertise. What factors are critical for children to move from novice to expert? This talk will outline the critical role of experience in this transition. Reading experience provides much more than repeated exposure to individual words in isolation. Words are experienced in meaningful language environments that capture events in the world. According to the lexical legacy perspective, outlined in this talk, this type of experience is important for word reading development. At its heart is the idea that reading provides exposure to words in many different contexts, episodes, and experiences which, over time, sum to a rich and nuanced database about their lexical history within an individual's experience. These encounters bring about local variation at the word level: a lexical legacy that is measurable during word reading behaviour, even in skilled adults.

Keynote

Children's friendships: Open sesame to possible worlds

Professor Judy Dunn, *King's College London*

It is unquestionable that friendship matters to children by middle childhood, but what do we know of its beginnings? I draw on a series of longitudinal studies of children growing up in Pennsylvania, in Cambridge and in London. Important relationships with other children emerge at the end of the first year. A close look at these children in the context of their friendships gives us a new window on their social understanding and on how their friendship experiences influence the development of their understanding. We carried out unstructured observations of pairs of friends playing alone, and a broad range of assessments of 'Theory of mind', emotion understanding and moral views. We interviewed the children about hypothetical transgressions (name-calling, excluding a friend from play, taking a toy from a friend etc.), and the children gave their views on these actions, if they themselves were victims or if they were the transgressors. A central theme from the earliest friendships was that friends shared pretend adventures, games, stories, heroes and villains. The answer to the question, 'what lies behind differences in friendship quality in the early school years' is a complicated one, but the shared experiences of joint pretend in the preschool years is linked to the experiences of shared cooperative play as preschoolers. The evidence that sharing and negotiating an imaginary world in pretend play provides a potent context for talking and learning about why other people behave the way they do. What's important is not just the individual characteristics of friends, but the relationship they create together.

Distinguished Contribution Award

From Beyond Modularity to Neuroconstructivism: Annette Karmiloff-Smith's unique contribution to developmental psychology

Professor Annette Karmiloff-Smith *Birkbeck, University of London*

Annette Karmiloff-Smith was awarded the BPS Distinguished Contributions Award shortly before her death in December 2016. In this talk, her former postdoctoral fellow, Michael Thomas, discusses the main intellectual contributions of Annette's research career, from her initial work with Inhelder and Piaget, through her re-conceptualisation of modularity as a product of development rather than a precursor to it, and her later shift into cognitive neuroscience, where her study of genotype-phenotype relations in genetic disorders such as Williams syndrome led to the influential proposal that development itself is the key to understanding developmental disorders.

Margaret Donaldson Award

Dealing with distractions: The development of inhibitory control

Dr Lucy Cragg *University of Nottingham*

Improvements in inhibitory control, the suppression of impulsive or distracting thoughts and behaviours, play an important part in successful cognitive development. Inhibitory control has also been linked to development in a number of other domains including language, social processing and mathematical cognition. Some theoretical models propose a single inhibitory mechanism whereas others suggest that there may be multiple domain-specific inhibitory mechanisms that operate in parallel. In this talk I will present a number of studies that speak to this debate and discuss the implications for studying the role of inhibitory control in the development of other cognitive domains.

Neil O'connor Award

Handedness and language lateralisation in neurodevelopmental disorders

Dr Jessica Hodgson *University of Nottingham*

My research explores the relationship between hemispheric speech lateralisation and motor skill involving the hands. Neuropsychologists have known for many years that these two functions are represented in a unique way in the human brain, and that being left or right handed is linked to the way the brain is organised to support speech and language. Using a relatively new methodology in cognitive neuroscience; functional Transcranial Doppler (fTCD) ultrasound, I have investigated the associations between these two functions. In this talk I will present the findings from a series of studies which look at the links between speech lateralisation and handedness in different populations, including a developmental group and a group with a neuro-developmental disorder; Developmental Co-ordination Disorder (DCD). I will also present data from a new paradigm involving functional Transcranial Doppler imaging which aimed to quantify the hemispheric involvement in different motor skill/handedness tasks.

JSDP Award Winner

Getting Older, Getting Happier?: Self-regulation and Age Trends in Well-being in Japan

Hideki Okabayashi *Meisei University*

The purpose of this study was threefold. I examined: (1) age trends in the subjective well-being of a sample of residents from a Japanese community; (2) the factor structure of a questionnaire on self-regulation strategies; and (3) the effects of self-regulation strategies on age trends in subjective well-being. A survey was mailed to 3,000 residents ages 25 to 79 years who were randomly selected from a residential registry of a Tokyo suburb in October 2011. The number of valid responses (40.2% response rate) was 1,205, which comprised the study participants. There were 3 major findings. First, life satisfaction increased from young to late adulthood and depressive symptomatology decreased from young to middle adulthood, then increased in old age. Second, confirmatory factor analysis revealed that self-regulation strategies were organized into 3 factors, "positive interpretation," "tenaciousness in goal pursuit," and "serenity for distancing from obsolete goals." Third, the age trend in life satisfaction was mediated by positive interpretation and tenaciousness. Furthermore, the effect of tenaciousness on life satisfaction was mediated by positive interpretation. Among participants aged 59 years or under, the reduction in depressive symptomatology was mediated by positive interpretation; among those aged 60 or over, the worsening age trend in depressive symptomatology was not mediated by any of the self-regulation strategies. These results suggest that we should pay more attention to self-regulation strategies in the "pre-action" phase before setting a goal.

Poster

When do children begin to experience moral elevation and what does it do?

Shazza Ali *University of Kent (ESRC CASE studentship)* **Julie Van de vyver** *University of Lincoln* **Dominic Abrams** *University of Kent* **Lindsey Cameron** *University of Kent*

Objectives: A growing body of research has drawn attention to moral elevation - the emotional response to moral beauty - and the potential that it has in mobilising people to engage in prosocial behaviour. The present research examines the effect of moral elevation on prosocial behaviour towards ingroup and outgroup members, in children aged 4– 11 years old.

Design: Between subjects design.

Methods: Across two studies (study 1, n =91; study 2, n =130) participants were randomly assigned to watch an elevating (i.e. children engaging in morally virtuous behaviour) or a neutral video. After viewing the video, appraisals of the behaviour and the experience of elevation were assessed. Study 2, included measures of prosocial behaviour intentions towards ingroup and outgroup members.

Results: Participants in the elevation condition reported feelings of elevation, which mediated the desire to be a better person (study 1). There was a significant interaction between condition (elevation vs. control) and target (ingroup vs. outgroup) prosocial intentions, and a marginally significant interaction with target prosocial behaviour (study 2). Compared to the control, participants in the elevation condition showed significantly higher prosocial intentions towards German children. Additional moderation and mediation models are explored.

Conclusions: These studies demonstrate that children begin to experience the emotional state of moral elevation in response to acts of moral beauty during middle childhood. The experience of moral elevation may promote an other-orientated focus.

Poster

Saudi children and their mothers' reasoning about exclusion

Munirah Alsamih *University of Surrey* **Harriet Tenenbaum** *University of Surrey*
Patrice Rusconi *University of Surrey*

Categorising individuals into groups based on national and religious identity is enough to produce bias (Tajfel & Turner, 1985). Eliash, Mills and Grant (2010) found that Muslims children endorsed negative attributions for non-Muslims (outgroup) more than Muslims (ingroup) also they showed ingroup preference. Allport (1945) argued that children adopting their parent's attitudes towards out-group. One important issue related to intergroup attitudes is peer exclusion based on group identity. Previous research on exclusion has focused on children in the US and Europe. Also, past research has not compared parents and children. To extend this line of research, the current study focused on peer exclusion amongst Saudi children and their mothers based on religion (Muslim and Non-Muslim).

Participants: The participants consisted of 60, 8-, 10-, and 12-year-old Saudi children Saudi children and their mothers. They were recruited on a volunteer basis.

Procedure: Eight vignettes were read to the children and mothers separately, which asked their opinion about the excluding a Muslim or a non-Muslim peer by either a peer or a father.

Results: Compared to mothers, children were more accepting of exclusion, $F(1, 57) = 11.35, p = .001$, partial $\eta^2 = .20$. For the perpetrator, participants were more likely to accept exclusion by fathers than by peers, $F(1, 57) = 13.80, p = .0001$, partial $\eta^2 = .20$. The findings will be interpreted in relation to socialization of children in this socio-cultural context.

Conclusion: In sum, Saudi mothers showed tolerance and acceptance to out-group more than their children did. The results of this study could be used as a platform to design intervention programs build on transmitting mothers' attitudes to their children to promote coexistence in Saudi society.

Paper

What do eye movements reveal about inferring mental states from dynamic facial expressions in adolescents with ASD?

Elisa Back *Kingston University London*

Objectives: It has been suggested that people with Autism Spectrum Disorder (ASD) are impaired at using the eyes to infer mental states from faces. However, this claim has not been supported when using more natural dynamic stimuli. The research question was whether adolescents with ASD would have similar eye movement patterns to typically developing (TD) adolescents when processing mental states from faces.

Methods: Sixteen adolescents with ASD (11-16 year olds) were compared to a chronological age- and IQ- matched sample of 16 TD adolescents. Eight dynamic mental states (e.g., worried) were presented in three conditions; whole face, eyes frozen and mouth frozen. In the frozen conditions, the particular facial region was static and neutral while the rest of the face was expressive and dynamic. Eye movements were recorded using a Tobii T120 eye-tracker.

Results: ASD and TD adolescents were faster to first fixate on the eyes than the mouth and the duration of their first fixation to the eyes did not differ between groups but it did for the mouth (shorter for the ASD group). Moreover, there was no difference between groups in total fixation duration, both groups looked longest at the whole face condition and looked longer at the eyes than the mouth.

Conclusions: Adolescents with ASD had similar eye movement patterns to TD adolescents when inferring mental states. Findings will be discussed in relation to spontaneous versus compensatory voluntary mental state processing and how the latter can help individuals with ASD in their everyday social interactions.

Poster

The antecedents of Low-level classroom disruption: A bio-ecological perspective

Suzanne Bartholomew *Canterbury Christ Church University* **Amanda Carr** *Canterbury Christ Church University*

Objective: Investigating Low-level classroom disruption (LLCD) from the 'person' and 'micro' systems of the bio-ecological model. Typically include; talking, swinging on chairs and using mobile devices. Individually these may seem like minor misdemeanors; however, 62% of primary teachers reported a medium - high negative impact on their classroom. LLCD is having a detrimental effect on teaching time, up to an hour a day being lost for some students.

How are the 'person' variables and the 'micro-system' variables related to the students self-reported low-level classroom disruptive behaviour?

Design: The study is an exploratory longitudinal design, in order to establish causation rather than correlation results. This report presents the exploratory results from data collection one.

Methods: An opportunity sample Key Stage Two students (N = 274, 8 – 10 years) from three primary schools.

Self-reporting questionnaires and psychometric testing. Analysis of data; correlational techniques to explore pathways between variables and instruct data collection two.

Results at this stage include:

Moderation; having a TV in the bedroom resulted in a significant association between LLCD and the person variable of boredom. Having a TV in the bedroom also moderated the associations negatively between the person variables of self-esteem and pro-social classroom behaviour with LLCD.

Mediation; analysis found that the influence of the micro-system variable of home chaos on LLCD was fully mediated by the person variables of scholastic competence and boredom, and the micro-system variable of weekly screen time.

Conclusions: Ongoing SEM and cross-lagged carried out after data collection two.

Paper

The effect of school starting age on children's spontaneous focusing on numerosity and mathematical skills

Sophie Batchelor *Loughborough University* **Minna Hannula-Sormunen** *University of Turku* **Joke Torbeyns** *KU Leuven* **Victoria Simms** *Ulster University* **Bert De Smedt** *KU Leuven*

Objectives: Research has shown that preschool numerical skills are a remarkably strong predictor of later mathematical achievement. As such, there has been an increase in attention to early numeracy experiences, with studies demonstrating that children's informal

use and recognition of number (spontaneous focusing on numerosity, or SFON) is related to more formal mathematical skills.

Design: This study used a cross-sectional design to investigate whether the age at which children start formal mathematics instruction affects the development of (and interrelations between) SFON and mathematical skills.

Methods: Children (N=685) aged 4 to 7 years participated from four countries; Northern Ireland, England, Belgium and Finland, where children start school at 4, 5, 6, and 7 years respectively. They completed measures of SFON, digit naming, verbal arithmetic and written arithmetic.

Results: The results revealed strong age effects for SFON, digit naming and arithmetic skills. There were significant country effects for all outcome measures, but the differences observed did not show a consistent pattern in a way predicted by the onset of formal mathematics instruction.

Conclusions: These findings suggest that the starting age of formal mathematics instruction does not have a significant effect on the development of SFON, mathematical skills and the relationship between SFON and arithmetic skills. While the predicted country effects were not observed, this does not imply that education does not impact on learning. The countries involved in this study differ in what they describe as “formal schooling”, but the activities children engage with at different ages may be similar.

Paper

Effects of pornography on sexual development and behaviour

Lianne Beadsmoore *University of Nottingham* **Kevin Browne** *University of Nottingham*

There has been an increase in the availability and use of pornography due to ease of access, affordability and anonymity of ‘internet porn’ via a range of electronic devices. The aim of this study was to investigate the progression of sexual activities in both same sex and opposite sex partners and compare them to self-reported pornography use and ‘sexting’. In total 2647 (86%) completed an online questionnaire and 1786 (70.4%) were the target group of ‘Emerging Adults’ (18-25 with a mean age of 21). In this sample, 55.7% were female and 44.3% male with 75% heterosexual. Only 2% stated they had never viewed porn and 42% had viewed porn under the age of 13 years, 50% between 13 and 17 years and the remaining 6% from 18 years; 80% of respondents had engaged in sexting, 51% of them under 18. Males were 11 times more likely than females to use pornography on a daily to weekly basis, Non-Heterosexuals were 1.7 times more likely than heterosexuals and those who first viewed pornography under the age of 13 were 1.7 times more likely. Early onset of pornography use (before 13) is related to earlier sexual activity, early age of sexting and more frequent use of pornography. For females only, early onset of pornography use was associated with a history of family breakdown and a preference for same sex partners. Sex education should emphasise trusting/long-term relationships and challenge ‘internet porn’ that encourages underage and unsafe sex.

Poster

Associations between Preterm Birth / Low Birth Weight and signs of behaviour difficulties at 9 months of age: Findings from the Millennium Cohort Study

Rachael Bell *Queen's University, Belfast* **Oliver Perra** *Queen's University, Belfast*
Fiona Alderdice *University of Oxford/ Queen's University, Belfast*

Objectives: Preterm birth and low birth weight have been identified as potential key risk factors for behavioural problems in children. The aim of this study is to investigate the links between preterm birth/low birth weight and infants' behaviour at 9 months of age, highlighting possible precursors to later problem behaviour.

Design: Cross-sectional analyses of the first wave of the Millennium Cohort Study (MCS), a British longitudinal study.

Methods: Secondary data analyses (bivariate analyses, logistic regressions and multiple regressions) were conducted on 18,552 families sampled by the MCS. Data were collected through 2 sets of interviews; a main respondent, and their partner. Results concerning preterm infants and low birth weight infants were analysed separately.

Results: Analyses of the data, using two key behavioural assessments (Denver Developmental Screening Test and Carey Infant Temperament Scale) as outcomes, revealed that preterm birth/low birth weight is strongly associated with poor behavioural outcomes. Low birth weight and preterm birth were significantly associated with poor behavioural outcomes even when controlling for other risk factors (i.e. socio-economic status, parental mental health, parenting behaviour, perinatal factors, and family structure).

Conclusions: Preterm birth/low birth weight is associated with early signs of behavioural difficulties as early as at 9 months of age. Potential risk factors and mechanisms that may contribute to the development of problem behaviour are highlighted within the study.

Poster

Relationship Between Specific Aspects of Language Acquisition and Arithmetic Performance in typically-developing Year 2 Pupils

Robin Bendix-Hickman *Merton College, University of Oxford* **Jane Mellanby** *Oxford Group for Child Potential, Department of Experimental Psychology, University of Oxford*

Objectives: It is unclear the extent to which language develops in isolation. This study investigated whether an observed association between mathematics and language could be attributed to specific constructs that mediate a direct link.

Two such structures were investigated:

- 1) The quantitative comparator (e.g.'longer').

2) The verbal-mathematic 'link' construct in an arithmetic word problem (AWP), e.g. 'more', 'altogether'.

Design: Pupils were tested on a range of measures over 3x20-minute testing sessions.

Methods:

Participants: Entire Year 2 (mean age=86 months) cohorts (apart from 11 opt-outs/severe SEN) at 3 comprehensive primary schools. Total n=83.

Measures: Pupils were tested on non-verbal reasoning (NNAT), working and short-term memory (AWMA), simple and complex grammar comprehension (TROG, Conditional grammar comprehension), arithmetic (WOND), and AWP. Analysis was carried out using SPSS Version 24.

Results:

1) Pass/fail performance in quantitative, but not non-quantitative, comparator comprehension was associated with pass/fail in arithmetic.

2) The difficulty of an AWP (with basic arithmetic demand) was determined by the 'Type' of problem (reflecting the verbal-mathematic 'link' construct). This was independent of the wider verbal context, as embedding the problem in a complex grammatical structure (which were poorly understood in isolation) did not complicate the problem.

3) Both results appeared to be independent of cognitive domain-general factors (WM, STM, fluid intelligence).

Conclusions: Specific constructs appear to mediate a link between maths and language. This suggests that educational strategies that use a multi-disciplinary approach may be most effective.

Key limitations include sample size and effect of teaching.

Paper

Differences in language and executive function skills across children from high-, mid- and low-SES backgrounds.

Nicola Botting *City University of London* **Amber Scott** *City University of London*
Jessica Stevens *City University of London* **Julie Kinninmont** *City University of London*

Background: The development of children's Executive Function (EF) and language skills are important for their academic achievement and socio-emotional well-being (Gregg & Machin, 2000). Previous research has found that the performance of children from lower socio-economic status (SES) backgrounds on language and EF tasks tends to be worse than peers from higher SES backgrounds (Sarsour et al., 2011). However, previous research has focussed on pre-school children.

Methods: Data was collected from 36 children (6-9 years old) from three different SES groups (low, mid and high) in London who had no identified Special Educational Needs. EF was measured using tests of planning, working memory, inhibition and non-verbal fluency. Language skills were measured using a test of receptive vocabulary, narrative and a test of expressive grammar. Analysis used ANOVAs on scaled scores and ANCOVAs controlling

for age where no scaled scores were available. Correlations were run between EF and language measures.

Results and implications: Receptive vocabulary, expressive language, working memory and planning skills were found to be poorer in participants from lower SES groups compared to those from higher SES groups but the pattern differed according to task: For some skills, a disadvantage was seen for the low-SES group, whilst for other tests the high-SES group performed better than both low-and mid-SES groups. The results have implications for the importance of targeted interventions to support the development of receptive vocabulary, expressive language, and EF skills in children from lower SES backgrounds, and for boosting those in mid-SES families.

Paper

Exploring emerging access to mental files in preschool children

Josie Briscoe *University of Bristol* **Isabel Sherman** *University of Bristol*

Objectives: This study explored the ability to identify sense as linked to multiple referential aspects of object knowledge in relation to flexible categorisation. We asked whether a developmental association in three to five year old children could be observed between access to sense-reference relations and children's conceptual flexibility in order to evaluate Mental Files Theory (Perner & Leahy, 2016).

Design: An identity task was developed from Perner (2011). Children followed four narrated scenarios involving a protagonist (Mr Jones). Test trials required selection of the protagonist as given by "Mr Jones is THE firefighter" to elicit the identity of Mr Jones. Two categorisation tasks assessed thematic and taxonomic associates, either within a single trial (dual-categorisation) or across discrete trials (simple-categorisation). We propose that age-related gain on the identity task would be associated with success on the dual-categorisation task, due to a common locus in the ability to link multiple referents of a common object.

Methods: 60 children (3-5 years) were recruited. Linear-by-linear association tests were used to identify age trends.

Results: Age differences were found for identity tasks ($\chi^2(1) = 6.903$, $p=.009$) and dual ($F(2,57)= 3.87$, $p<.001$ and simple ($F(2,59)= 14.57$, $p<.001$) categorisation tasks. Only a consistent response pattern on dual categorisation showed a linear age trend as associated with the identity task ($\chi^2(1)=.394$, $p=.017$).

Conclusion. By 4 years, older children can track predicative relations and maintain a specific referent, despite competing alternatives. The ability to inhibit multiple perspectives may drive the emerging ability to generate 'horizontal links' between mental files.

Paper

Impact of UN guidelines on institutional care of young children in europe

Kevin Browne *University of Nottingham* **Shihning Chou** *University of Nottingham*

Young children continue to be frequently placed in residential care institutions (RCIs) throughout the world. This occurs despite wide recognition that RCIs are associated with harm and negative consequences for children's development (Browne, 2009). UN Guidelines state that alternative care for young children should be only provided in family settings (UNICEF, 2010) to reduce harm to the developing brain.

To establish the number and characteristics of young children (less than 3 years) in RCIs of 11 or more children for more than 3 months without a parent, a Survey of Government Official Statistics was carried for 54 Countries across Europe and Central Asia. Data from 51 countries showed there were 32,627,008 children in the population less than 3 years with 31,520 of these children living in RCIs without a parent (9.7 per 10,000). A third of countries in the region have more than 1 per 1000 young children less than 3 years living in RCIs. Ten years earlier 2002/03, the rate was 14.4 per 10,000 children under 3. Thus, the decrease of 4.7 per 10,000 shows there has been a slow decline over the past decade of approximately 0.5/10,000 per year.

Discrimination against single mothers, ethnic background and child disabilities, together with poor education and family planning, unwanted pregnancies, poverty, international adoption, refugees and economic migration were all cited as causal risk factors for institutional care.

Paper

Impact of UN guidelines on foster care of young children in europe

Kevin Browne *University of Nottingham* **Shihning Chou** *University of Nottingham*

UN Guidelines for 193 Member states, state that alternative care for young children, less than 3 years, should be only provided in family settings. The aim of this study was to assess changes in the number of young children living foster care. To establish the number and characteristics of children in foster care less than 3 years, a Survey of Government Official Statistics was carried for 54 Countries across Europe and Central Asia. Data from 2013 were compared to findings related to young children in foster care from a previous survey in 2003 of the same countries. Data from 44 countries in 2013 showed there were 66,354 children less than 3 years in foster care but the provision varied widely from country to country. Six countries used foster/kinship care exclusively for young children (UK, Norway, Iceland, Slovenia, Cyprus & Ireland). Ten other countries had increased the proportion of young children in foster care since 2003. Surprisingly, there were no significant associations between the number of foster families and the number of children under three in institutions (N= 28) or under eighteen in institutions (N=29). Increase in foster care provision over the past ten years has absorbed the increase in the numbers of children being placed into 'out of home' care, partly due to greater recognition of child abuse and neglect and a proliferation of

child protection services. Children from ethnic minorities and/or with disabilities are discriminated against for foster care and still remain in institutional care for long periods.

Symposia

Word, words, words: what is their matter, my lord?

Peter Bryant *Department of Education, University of Oxford*

Theme: The theme of this symposium is the bi-directional relation between linguistic awareness and literacy. When children learn literacy, their task is to understand how their language is represented in writing. This representation involves correspondences between phonology and graphic signs as well as the representation of morphemes and syntax in writing. Three abilities - phonological, morphological, and syntactic awareness - help children understand how their language is represented in writing. These types of awareness are general forms of knowledge, which can be transferred across words and sentences, within a language, and across languages. They influence, and are influenced by, literacy.

Objectives: This symposium's aim is to demonstrate the abstract nature of phonological, morphological, and syntactic awareness as well as their significance for literacy learning. Chan shows the transfer of phonological awareness across languages. His study suggests that children can learn to use letters to represent sounds in one language and apply this knowledge to another language. Burton shows that the principle of conservation of stems is transferred across words, and demonstrates the impact of morphological awareness on spelling. Nunes et al show that teaching morphological and syntactic awareness to children from lower SES, who tend to lag behind in these abilities, improves their literacy skills. Zheng shows that the connection between oral words and their spelling is strengthened by simultaneously learning the word's meaning. When specific knowledge is required for learning spelling, meaning makes the specific letter string a morpheme, which is learned better than meaningless strings.

Paper 1

Phonological awareness as a language-general ability

Yu Chan *Department of Education, University of Oxford*

Objectives: The aim was to test the hypothesis that phonological awareness is a language-general ability. This hypothesis leads to the prediction that phonological awareness is transferable between different languages.

Design: In a randomised controlled trial, participants were randomly assigned to one of three groups: phonological awareness instruction in English; phonological awareness instruction in Cantonese; active control with instruction on print concepts. Pre- and post-tests (one immediate, one after a week) included three measures in English and three in Chinese: rhyme oddity, initial phoneme deletion, and final phoneme deletion.

Methods: Cantonese-speaking 5-year-olds (N=47) in Hong-Kong, who learn English as a second language, were randomly assigned within their classes to one of the three training

conditions. Each group received a four-week intervention comprising fifteen-minute individual training sessions twice a week.

Results: After controlling pre-test scores, there were significant group effects on all three measures of phonological awareness in both languages. Contrasts using the Bonferroni correction revealed that the English instruction group outperformed the control group in all three English and all three Cantonese measures ($p < .001$ for all analyses). The Cantonese group also outperformed the control group in all three English and all three Cantonese measures ($p < .001$ for all analyses). Effect sizes varied between $d = 2.2$ and 3.9 .

Conclusions: It can be concluded that phonological awareness is a language-general ability that can be transferred across languages. Children do not learn to analyse words in their language into sounds but learn that words in any language are made of sounds, which can be manipulated.

Paper 2

Improving literacy outcomes for children from lower socioeconomic backgrounds

Terezinha Nunes *Department of Education, University of Oxford* **Peter Bryant** *Department of Education, University of Oxford* **Deborah Evans** *Department of Education, University of Oxford* **Rossana Barros** *Department of Education, University of Oxford* **Susan Baker** *Department of Education, University of Oxford* **Philea Chim** *Department of Education, University of Oxford*

Objectives: The study's aim was to test whether one can improve literacy in children from lower socioeconomic (SES) backgrounds by strengthening their morphological and syntactical awareness. Children from lower SES progress fast in literacy in the first two years, while learning about letter-sound correspondences, but their progress slows down subsequently. This change is associated with the linguistic processes that become more relevant at this time, morphological and syntactic awareness.

Design: A randomized controlled trial with randomisation at school level was used to minimise the risk of contamination. Literacy pre- and post-tests, were chosen and implemented by independent evaluators, who were blind to group membership.

Methods: Participants (1536 children in Year 2; 252 eligible for free school meals [FSM]) were from 38 schools. In intervention schools, teachers implemented during the literacy lessons a 10-units intervention designed to promote children's awareness of morphology and syntax. Children were taught to identify morphemes, to relate them to meaning, and to use them to work out the meaning of novel words; to judge the grammaticality of sentences and to use this knowledge to interpret sentences. The control schools were business as usual.

Results: Multilevel model analyses showed an interaction between FSM status and intervention: FSM children in the control group showed less progress than expected from pre-test ($B = -1.36$) whereas those in the intervention group showed greater progress than expected ($B = +2.1$). Non-FSM intervention and control children did not differ significantly.

Conclusions: The results suggest that teaching morphology and syntactic awareness narrows the SES gap in literacy.

Paper 3

Explicit and implicit learning of morphological spelling rules

Lauren Burton *Department of Education, University of Oxford*

Objective: The study aimed to investigate whether teaching children morphological spelling rules improves spelling accuracy of stems in derivatives. Children often struggle to spell word stems in derived words (e.g. magician) when there are changes in the stem's spoken form. It was hypothesised that explicitly teaching children about stems leads to greater improvements in their spelling of stems than implicit teaching.

Design: Children were randomly assigned to one of three groups: an explicit group explicitly taught about word stems; an implicit group exposed to the same stems and tasks but without any explicit teaching; and an unseen control group. A pre-test, immediate post-test, and delayed post-test design was employed.

Methods: Ninety children in Years 3 and 4 from three state-supported schools participated. In the pre- and post-tests, all children spelled derived words not used during teaching. The intervention sessions involved training games in which the children spelled derived words after seeing the base forms; the explicit group discussed the connection between the spellings whereas the implicit group did not.

Results: Analyses of variance revealed that the explicit group significantly outperformed the control group in the immediate ($d=1.85$) and the delayed post-test ($d=1.38$) and also outperformed the implicit group in both post-tests ($d= 1.07$ and $d=0.80$). The implicit group significantly outperformed the control group only in the immediate post-test ($d=0.68$).

Conclusions: It is concluded that explicit teaching combined with appropriate spelling games shows a sustained effect on children's spelling. The evidence supports the integration of morphemes into current educational policy.

Paper 4

Learning Meaning Improves Chinese Children's English Spelling

Zhen Zheng *Department of Education, University of Oxford*

Objectives: The study's aim was to test whether learning a letter string to represent an utterance is significantly facilitated by learning a meaning for the utterance, which makes it into a word. Words in literate societies have three elements - pronunciation, spelling and meaning. It is hypothesised that meaning makes an utterance into a word and its spelling is more effectively learned.

Design: A within-participants design was used; the meaning of half of the target words was presented before their spelling was practised whereas for the other half the meanings were not presented before the spelling practice. The two lists of five words were used in both conditions to control for stimuli effects. Order was systematically varied.

Methods: Participants (53 Chinese children aged 7-9 years) learned English words infrequent in their context (e.g. bait, gale), which contained vowel sounds that could spelled

in more than one way. After practising their spellings and those of distractors, the children were tested immediately on the spelling of the target words and again after a filled interval.

Results: Participants spelled words learned with meaning more accurately than those learned without meaning. This difference was statistically significant for both post-tests ($p < .001$). Cohen's d effect sizes were 0.6 for the immediate post-test and 0.78 for the second post-test.

Conclusions: It is concluded that letter strings learned with meaning acquire the status of words and are more easily learned than those learned without meaning. This effect is unexpected from current theories about how children learn letter-sound correspondences.

Paper

Learner and consumer identities in undergraduate students: Are there developmental changes in predictive factors that are affected by year of study?

Louise Bunce *Oxford Brookes University* **Melanie Bennett** *Independent researcher*
Sian Jones *Goldsmiths*

Previous research has shown that some undergraduates studying in England, UK, are beginning to self-identify as consumers of their education rather than learners. In other words, they are beginning to express attitudes and behaviours that entail a sense of entitlement to a degree in exchange for their tuition fees. Socialisation processes, as specified by Social Identity Theory, may mean that, over time, students adopt a higher level of consumer identity at the expense of a learner identity during the course of their degree, as universities market themselves as service providers and emphasise the student 'experience' as opposed to purely education. To test this hypothesis 679 undergraduates completed a questionnaire to assess their consumer identity, social identification with other students on their course, approaches to learning, and a number of demographic factors including year of study. Regression analyses revealed a significant model that accounted for 31% of the variance ($R^2_{adjusted}$) in consumer identity. The main correlate with consumer identity was approach to learning - a surface approach, i.e. one that entailed memorising facts to pass a test, was positively correlated with consumer identity. Contrary to the hypotheses, there was no relationship between consumer identity and social identity, nor a developmental change as shown by an insignificant effect of year group on consumer identity. Although correlational, the findings suggest that one way to minimise students identifying as consumers will be to reduce the extent to which they can succeed in their studies by adopting a surface approach to learning.

Paper

Children's moral judgements in the mini-ultimatum game are sensitive to the intentions of proposers.

Patrick Burns *Queen's University Belfast* **Agnieszka Jaroslawska** *University of Edinburgh* **Áine Fitzpatrick** *Queen's University Belfast* **Eugene Caruso** *University of Chicago* **Teresa McCormack** *Queen's University Belfast*

Objectives: When attributing blame and culpability in cases of harm, adults typically take account of both the outcome of the agent's actions as well as the intentions of the agent. By contrast, studies with primary school age children have consistently indicated a lack of sensitivity to the intentions of others when making moral judgements.

Design: The mini-ultimatum game (MUG) is a task in which sensitivity to the intentions of others can be measured in the context of punishment behaviour. In standard ultimatum games a responder is given the opportunity to reject (at a cost to the self) unfair distributions of resources made by a proposer. In the MUG the options open to proposers are restricted such that on occasion unfair distributions are unavoidable.

Methods: We investigated the developmental trajectory of sensitivity to intentions in the MUG. As well as manipulating the intentions of proposers we also varied the temporal context (future vs past) in which responders made judgements, following evidence that adults judge future moral transgressions more harshly than past ones (Caruso, 2010).

Results: Contrary to previous published studies (Guroglu, van den Bos & Crone, 2009; Sutter, 2007) we found that children as young as 6-8 years of age took account of others' intentions to act unfairly. However, we found no evidence of temporal asymmetry in moral judgements among primary school children.

Conclusions: We discuss these findings in relation to the development of moral and temporal cognition.

Poster

Prosocial behaviour in children on the autism spectrum.

Eilidh Cage *Royal Holloway, University of London* **Milade Adenekan** *Royal Holloway, University of London* **Olivia Coote** *Royal Holloway, University of London* **Alice Golding** *Royal Holloway, University of London*

Objective: The current study aimed to examine prosocial behaviour in children on the autism spectrum.

Design: Participants completed an experiment adopting a method from Engelmann et al. (2012), where children could share or steal in a sticker task. We also tested whether variables such as Theory of Mind or empathy could contribute to prosocial behaviour.

Methods: Thirteen children on the autism spectrum were matched to thirteen typical children on verbal mental age (mean VMA = 6.16). Participants had to complete a sticker sheet, filling in shapes with stickers. They could see the next child's sticker sheet and were left to complete their sticker sheet alone. In the sharing task, they were given too many stickers

and were told they could give leftover stickers to the next child. In the stealing task, they were given too few stickers, but could see that the next child had been given too many stickers. The experimenter recorded whether the child shared or stole stickers. We also measured Theory of Mind (using the Strange Stories task) and empathy (using the EmQue).

Results: Results showed no difference between typical and autistic children in sharing or stealing behaviour. There were significant differences in Theory of Mind between the groups but not in empathy, and neither variable predicted helping or stealing behaviour.

Conclusions: Although limited by a small sample size, this study shows no differences in prosocial behaviour in children on the autism spectrum, suggesting that despite their social challenges, autistic children are more than capable of prosociality.

Poster

Parents as reporters of their children's communication skills: language versus phonology and the case of high-risk children

Helen Cain *City, University of London* **Nicola Botting** *City, University of London*
Natalie Hasson *City, University of London*

Introduction

Parent report measures are often used to investigate the communication skills of young children, particularly those who may not be easy to test using formal assessments. Previous research suggests that parents are generally accurate reporters of their children's language and communication skills, although this can vary according to socio-economic status. However, little is known about how parental report measures may agree with observational data in areas of language such as phonology, and the relationship between parental report and direct assessment measures in high-risk children.

Method

92 children were recruited between the ages of 8 and 22 months, including 17 children at high risk of developing social communication difficulties and 22 children at high risk of difficulties with language. The children were assessed on a range of formal and semi-structured measures, and parents were asked to complete a variety of questionnaires providing information on different aspects of their children's communication, including a vocabulary inventory, social communication checklists and a novel phonological inventory.

Results

As found in previous studies, parent report and direct assessment measures of language and communication skills showed high correlations in the sample as a whole. However, these relationships were weaker or absent in the language-high-risk subgroup. It was also found that, in contrast to other measures, the parent phonological inventory did not show a strong relationship with a phonological inventory completed during the assessment session.

Conclusion

The implications of these results for the use of parent report measures in research and clinical practice will be discussed.

Paper

The retention mechanism of working memory of young children

Hsiang-Chun Chen *National Tsing Hua University* **Lai-Sang Iao** *Nottingham Trent University*

Objectives: Attention switching during the processing episodes to briefly reactivate decaying memory traces is a key factor affecting children's recall performance. Previous studies suggested that children younger than 7 years old's switching between processing and storage was stimuli-driven as described by the task-switching model whereas children older than 7 years old's pattern of performance reflected the micro-level switching described by the time-based resource-sharing (TBRS) model. The current study further investigated whether the working memory retention mechanism of young children changes qualitatively with age when both nonverbal IQ and listening comprehension were carefully controlled for within each age group.

Design: A 3 (children aged 4, 5, and 7 years) x 3 (colour-naming tasks: one-colour-short, two-colour-short, and two-colour-long) between subjects factorial design was used. The dependent variable was verbal working memory span.

Methods: Forty-five children aged 4 (M = 55.4 months, SD = 2.84), 45 children aged 5 (M = 63.6 months, SD = 3.01), and 45 children aged 7 (M = 88.1 months, SD = 3.41) participated. Each age group was further divided into 3 subgroups, matching for their nonverbal IQ and listening comprehension score. Each subgroup was then randomly assigned to one of three colour-naming tasks that differed in either the duration or the attentional demand of the processing episodes used by Camos and Barrouillet (2011).

Results: Data collection is in progress.

Conclusion: This study aimed to clarify important theoretical issues regarding the interference effect of processing episodes, and to further our understanding of young children's working memory retention mechanism.

Paper

Dealing with indirect evidence: Can children imagine unseen causes or do they learn associations?

Zeynep Civelek *University of St Andrews* **Josep Call** *University of St Andrews*
Amanda Seed *University of St Andrews*

Objectives: Adults have two routes to learning new things: they can associate two arbitrary events or find a causal explanation. The previous research examining children's causal learning suggests that children are like "scientists" from the beginning; they observe regularities in the environment, interpret evidence and make interventions to test their predictions. However, it has also been demonstrated that the use of causal language in these paradigms might be scaffolding young children's abilities.

Design: This study examined causal learning in children with a naturalistic design that did not depend on linguistic explanation.

Methods: 3-6-year-olds (N= 124) were presented with an event in which a reward was dropped into a forked tube into one of the two cups. Children must learn to use an auditory cue to locate the reward. In the causal condition, the cue followed the dropping event, making it plausible that the sound was caused by the reward falling into the cups; and in the arbitrary condition, the cue preceded the dropping event, making the relation arbitrary.

Results: There was a marginally significant effect of condition ($F(1, 119)=3.75, p=.055$), suggesting children can go beyond learning associations when detecting causality; and an effect of age ($F(3, 119)=3.08, p<.05$). The breakdown of different age groups' performances and categorizations of their verbal explanations about how they found the reward revealed a U-shaped-curve which may indicate a representational change.

Conclusions: Pre-schoolers go beyond associations to infer hidden causes even without verbal prompting, and the mechanism for doing so shows an interesting developmental curve.

Paper

Mother-infant synchrony, infant responses, and maternal behaviours during complementary feeding

Cristina Costantini *Oxford Brookes University* **Vasudevi Reddy** *University of Portsmouth* **Lucy Akehurst** *University of Portsmouth*

Objectives: The transition from milk to complementary feeding (CF) may be difficult, requiring adult sensitivity to infant signals of hunger and satiety. Little is known regarding maternal feeding behaviours, communicating and synchronising with the infant at the early stages of CF. Thus, this study aimed to explore mother-infant synchrony, infant responses, and maternal behaviours during CF.

Design: Due to the different attitudes towards food as well as different health systems, the study investigated CF in two European countries: Italy and the UK. Moreover, due to the developmental changes that occur between 6 and 7 months, mother-infant interactions were explored at Time 1 (one week after the onset of CF), and at Time 2 (at 7 months of infant age).

Method: Thirty-eight mother-infant dyads took part in the study with mealtimes video-recorded at both Times. The first five minutes of mealtimes were coded for maternal waiting, pushing, and co-eating, food willingly eaten (FWE) by infants, and synchrony between spoon approach and infant mouth opening.

Results: Synchrony increased between Time 1 and Time 2. Synchrony and co-eating related to FWE at Time 1; a relationship was also found between synchrony and FWE at Time 2. Italian mothers used to co-eat more than British mothers at both Times, whereas they pushed their infant to eat more than British mothers at Time 2.

Conclusions: Overall, the study suggests that even early in CF, maternal feeding practices vary across dyads and may need to be understood contextually as the foundations of future feeding relationships.

Poster

Children's Tool Innovation in Different Social Contexts

Nicola Cutting *York St John University* **Ian Apperly** *University of Birmingham* **Sarah Beck** *University of Birmingham* **Jackie Chappell** *University of Birmingham*

Objectives: To discover if children explore more and subsequently improve their ability to innovate simple tools when alone rather than with an Experimenter present.

Design: Between-subjects, experimental design. Children's innovation measured in two conditions: Experimenter Present or Experimenter Absent.

Methods: Children aged 4-to-7 (N = 84) were presented with a task requiring them to innovate a simple hook tool needed to retrieve a bucket from a tall narrow tube. This age group have previously been shown to have difficulty with this task. Children attempted the task either with the experimenter present or with the experimenter briefly leaving the room leaving the child unattended. Children were coded as successful if they retrieved the bucket within the time-frame. Exploration was coded by the number of material entries into the tube.

Results: Four- to- five- year olds explored more when left alone ($p = .004$). However, there was no difference in level of successful innovation between the two conditions in these younger children. In contrast, 6- to- 7- year-olds were more successful at innovating the hook tool in the Experimenter Absent condition ($p = .040$), although success still only reached 70%. Success in this condition was not explained by higher levels of exploration. Successful children tended to solve the problem quickly, suggesting that trial-and-error is unlikely to play a role in this particular task.

Conclusions: Younger children were unaffected by the presence of the experimenter. Older children's performance may be explained by audience effects that potentially add cognitive demands to the task.

Paper

Specialization of the motor system in infancy: From broad tuning to selectively specialized purposeful actions

Hana D'Souza *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Jolanta Golan** *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Dorothy Cowie** *Department of Psychology, Durham University* **Annette Karmiloff-Smith** *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Andrew J. Bremner** *Department of Psychology, Goldsmiths, University of London*

Objectives: A growing body of evidence suggests that, compared to later in development, the infant brain starts out less specialized, producing more widespread activation in response to stimuli. Such theorizing has hitherto been mainly applied to perceptual and socio-cognitive development. We investigated whether a similar process of gradual specialization operates in motor development in infancy.

Design: Across three empirical studies, we examined whether purposeful actions are initially 'broadly tuned' and widespread across limbs by measuring developmental changes in

extraneous movements (movements in the other limbs that accompany the movement of a limb engaged in goal-directed action).

Methods & Results: In Study 1, we found a decrease in extraneous movements between 9 and 12 months during reaching (N=38). We showed that this decrease is related to increased selective attention and motor experience. In Study 2, we demonstrated that spatiotemporal coupling of both arms is a general characteristic of motor functioning in early infancy, and that this coupling declines between 9- and 12-months of age (N=33). Furthermore, we observed increased coupling with speed. In Study 3 (N=22), we showed that extraneous movements are linked to, and likely limit, functional behaviour (in this case, intermanual coordination).

Conclusions: Infant motor activity starts out broadly tuned and becomes progressively specialized over development. Because motor difficulties often appear before the onset of other behavioural symptomatology in disorders of unknown aetiology (e.g., ASD, ADHD), it is possible that extraneous movements could be used as an early marker of neurodevelopmental difficulties.

Paper

Sleep constrains language development in atypically developing infants: A cross-syndrome study

Dean D'Souza *UCL* **Hana D'Souza** *Birkbeck* **Klara Horvath** *Oxford* **Annette Karmiloff-Smith** *Birkbeck*

Objectives: Sleep is a fundamental constraint on brain and cognitive development. Here, we investigate its effects on language development in infants and toddlers with different neurodevelopmental disorders (Down syndrome [DS], fragile X syndrome [FXS], and Williams syndrome [WS]). This is important for three reasons: (1) anecdotally, sleep is particularly disrupted in infants and toddlers with a neurodevelopmental disorder; (2) because early sleep measures predict later cognitive outcomes in typically developing (TD) children, they may also predict outcomes in atypically developing children; and (3) sleep may provide a useful target for syndrome-specific interventions.

Design and methods: We collected sleep and vocabulary size data from 60 infants and toddlers with a neurodevelopmental disorder and 60 TD age-matched controls, using a 10-day sleep diary (the Sleep and Naps Oxford Research Inventory) and parent report questionnaire (the Oxford Communicative Development Inventory). DS, FXS, and WS were selected for comparison because sleep is disrupted in older children with these neurodevelopmental disorders.

Results: ANOVA-based analyses and cross-sectional developmental trajectories confirm that sleep variables are indeed associated with vocabulary size in typically and atypically developing children. They also show that sleep patterns are significantly disrupted in infants and toddlers with neurodevelopmental disorders. Moreover, whereas sleep efficiency ('sleep quality') is related to language ability in TD children, night-time sleep duration ('sleep quantity') is associated with language ability in WS.

Conclusion: These data hint that sleep could be an appropriate target for intervention in WS.

Symposia

Embrace complexity! The unique legacy of Annette Karmiloff-Smith

Hana D'Souza *Centre for Brain and Cognitive Development, Birkbeck, University of London*

Professor Annette Karmiloff-Smith passed away in December 2016. She was a unique and inspirational developmental psychologist and woman. Initially working as a translator for the United Nations, she decided to change her career after encountering Piaget in Geneva. Annette was a brilliant communicator and a passionate advocate for the importance of taking development seriously when investigating child and adult cognition, neurodevelopmental disorders, and differences between humans and other species. She insisted on embracing complexity in order to unpack interactions between genes and environment over developmental time and across species, emphasizing individual differences every step of the way. Annette would not shy away from embracing complexity in her own empirical work - the ambitious interdisciplinary London Down Syndrome Consortium (LonDownS) being the most recent testimony of that.

Annette enjoyed advising and mentoring anyone who reached out to her – from students and faculty to parents of children with neurodevelopmental disorders. She was also a strong supporter of women in science. Annette was extremely committed to disseminating scientific theories and findings beyond research journals and conferences, often reaching a broad audience through support groups and mainstream media. Her books aimed at the lay public would aid parents in understanding the development of their children.

Annette's influence transcended developmental psychology and extended across various audiences, countries, and disciplines. In this symposium, we aim to capture Annette's enthusiasm and impact, and celebrate her legacy by bringing together her former students, colleagues, and collaborators to show how Annette has shaped theory and research.

Paper 1

Development itself is key to understanding ... Attention

Gaia Scerif *Attention, Brain and Cognitive Development Lab, Department of Experimental Psychology, University of Oxford*

Purpose and background: Annette Karmiloff-Smith was a great developmental scientist and mentor to multiple generations of researchers. With my talk, I aim to illustrate her lasting scientific and mentoring legacy.

I discuss how three scientific landmark contributions that brought me, amongst many other developmentalists, to be inspired by her theoretical and empirical approach, before explaining what this process meant more personally.

The first legacy is a focus on dynamic developmental change, as her work on developmental disorders so clearly exemplifies. The second example is a call to understand development not as simply the study of age-related differences, but as the study of the mechanisms of

developmental change. The third insight is the need to generate and test empirically theories of development.

Methods: I give examples of her long lasting influence on our discipline, drawing from our collaborative work on the developmental cognitive neuroscience of attention. These examples showcase theoretical contributions and pioneering methods developed by Annette within the field, but they also allow a reflection on her mentorship for scientists at all stages of their career, especially women.

Conclusions: Annette Karmiloff-Smith's focus on understanding mechanisms of developmental change continue to inspire our field.

Paper 2

Annette Karmiloff-Smith and computational models of development

Michael S. C. Thomas *Developmental Neurocognition Lab, Centre for Brain and Cognitive Development, Birkbeck, University of London*

Purpose and background: From her collaborative book "Rethinking Innateness", to her seminal paper "Development itself is the key to understanding developmental disorders", Annette Karmiloff-Smith saw computational modelling as playing an important role both in bridging between cognitive and neural levels of explanation and also in providing a foundation to understand the nature of development processes. In this talk, I discuss my collaborative work with Annette at the Neurocognitive Development Unit, Institute of Child Health, London. This work began with building computational models of developmental disorders, and led to multiple subsequent research streams over the following 15 years.

Methods: I give a brief overview of a program of computational modelling that began with capturing typical and atypical development, then expanded to address individual differences, the genetics of behaviour, brain structure and intelligence, socioeconomic status influences on development, the evolution of domain-relevant mechanisms, and interventions to remediate developmental deficits.

Conclusions: Annette Karmiloff-Smith's commitment to a multi-disciplinary approach to understanding development continues to influence theoretical progress on many fronts.

Paper 3

Embracing complexity: methods and models for mapping the dynamic relationships between social and cognitive development in diverse populations

Derek Moore *School of Psychology, University of Surrey*

Purpose and background: Annette Karmiloff-Smith was an outstanding developmental scientist who understood the importance of focussing on the dynamic nature of development within social contexts. She highlighted the key role of individual differences, and eschewed

the application of static neuroscience approaches to developmental disorders. In this talk I will present some key findings from recent studies that Annette and I were involved in. These studies, based in children's centres, targeted diverse populations of infants in East London. The purpose was to assess the feasibility of using neuro-behavioural methods outside of the lab for assessing emerging individual differences in infants from diverse socio-economic backgrounds. These studies, and the thinking behind them will illustrate Annette's approach and her influence.

Methods: I will present data from these recent empirical studies of infant development and also illustrate the dynamic nature of early social and cognitive development in low-socio-economic-status (SES) populations using the ACORNS visual modelling system, the development of which was also influenced by Annette.

Conclusions: The talk will show how Annette has influenced my thinking and explore how we can build on Annette's considerable legacy and ambitions and begin to more systematically and precisely characterize and embrace the complexity of the transactions between social and cognitive development across the life-course. Embracing complexity, and using more precise and dynamic casual models, should help us to realise Annette's ambition for a better and more deep understanding of the dynamic pathways that lead to developmental differences; and realise the ultimate aim of more effective interventions.

Paper 4

Across species and levels of description: Understanding development in infants and toddlers with neurodevelopmental disorders

Hana D'Souza *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Dan Brady** *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Esha Massand** *Centre for Brain and Cognitive Development, Birkbeck, University of London* **Annette Karmiloff-Smith** *Centre for Brain and Cognitive Development, Birkbeck, University of London*

Purpose and background: Annette Karmiloff-Smith passionately advocated for the importance of putting development at the core of our theories of neurodevelopmental disorders. She also argued that in order to truly understand neurodevelopmental disorders, we need to look at development across species and levels of description. This approach is evident in how she led the Infant Stream within the London Down Syndrome Consortium (LonDownS), a large interdisciplinary project investigating Down Syndrome (DS) and its link to Alzheimer's disease. One of Annette's aims within LonDownS was to nurture cross-talk between mouse modelling and human phenotyping. Although mouse models of DS hold great promise for advancing our understanding of the aetiology of cognitive profiles in humans with DS and may pave the way for targeted interventions, the strength of each mouse model critically depends on how well the tasks used with the mice map onto cognitive processes of interest in humans. Annette was focused on aligning the designs of the memory tasks with human infants/toddlers with DS with the tasks that are used with mice.

Methods: I will present data from the large scale study of around 100 infants/toddlers with DS that Annette was leading. I will discuss how an overlap between designs of tasks for

humans and mice may deepen our understanding of the cognitive profiles associated with DS. I will also highlight the challenges of aligning tasks across species.

Conclusions: Annette Karmiloff-Smith's passion for studying development across species and levels of description lives on in the next generation of researchers.

Paper

The Prenatal Concept of number: Further Evidence of Visual Processing of Information before Birth.

Kirsty Dunn *Lancaster University* **Nadja Reissland** *Durham University* **Robert Young** *Lancaster University* **Tim Donovan** *Cumbria University* **Vincent Reid** *Lancaster University*

Objectives: Like many other cognitive capacities, the study of the development of numerical understanding stops at neonatal research, most of all due to the practicalities of delivering visual stimuli and measuring response in a prenatal population. For the first time, Reid et al. (May, 2016) presented shapes of light to the late-term fetus finding a prenatal preference to shapes that were of a top-heavy than a bottom-heavy configuration. The present study aimed to investigate the processing of visual representations of number earlier in development than previously reported, before birth.

Design: Behavioural responses to stimuli were assessed in 63 participants, utilising 4d ultrasound.

Methods: Participants were excluded due to technical or experimenter error (2), poor image resolution (12), or if fetuses appeared to be in a behavioural state 1F (15) represented by a lack of eye or body movements through the scanning period (Nijhuis et al., 1982). This gave a final sample of 34. Light presenting 2 or 3 dots (order counterbalanced) was positioned on the maternal abdomen for 45 seconds to the side of the fetus (Left, N =16, Right, N =18).

Results: Fetuses spent more time looking towards than away from the 2-dot set only, $z = 2.293$, $p = 0.022$. No significant difference was found in looking to versus away from 3 dots.

Conclusion: This indicates a possible difference in processing of the two number sets. To our knowledge, this is the first study to investigate visual discrimination of number in a prenatal sample and provides the basis for a more thorough examination.

Paper

Instructional approaches and their influence on children's self-regulatory behaviour during a pretend play session

Janina Eberhart *University of Cambridge* **Sara Baker** *University of Cambridge*

This paper examines how different instructional approaches to a pretend play session influence children's demonstrated cognitive self-regulatory behaviour while controlling for children's executive function (EF) skills. EF, the cognitive processes that underlie cognitive self-regulation, are key for children's success in school and life. As a result researchers have

introduced educational programs in formal childcare settings with the goal of enhancing children's EF. Such interventions are encouraging as they indicate that children's EF can be positively influenced. However, it is not well understood which role instructional approaches play in enhancing children's self-regulatory behaviour. Therefore, this study targets this research gap and investigates whether certain instructional approaches to a pretend play session are associated with higher levels of demonstrated self-regulatory skills. The research will be informed by pilot data of reception class children participating in the experimental study. Children's EF skills will be measured with a comprehensive battery of EF tasks. A pretend play session will be introduced with four different instructional approaches varying on the level of teacher and child centeredness. The pretend play session will be videotaped and children's self-regulatory behaviour will be coded. Associations between instructional approaches and children's demonstrated self-regulatory behaviour will be established. Exploring the relationship between instructional approaches and children's demonstrated self-regulatory behaviour will help to better understand how EF can be enhanced by teachers in a classroom setting. Since EF is associated with a variety of positive outcome variables it is important to examine how children's EF skills can be enhanced.

Symposia

The Effect of Family Factors on the Executive Function Development

Michelle Ellefson *University of Cambridge*

Theme: The theme of this symposium is to explore the role of various familial factors on children's development of executive functions (EF) across childhood and early adolescence.

Objectives: The key objective for this symposium is to explore the role of various familial factors (parenting skills, socio-economic status, parental education) and their links to EF skills. The age range of this symposium reflect areas where there are a good number of existing studies (young children) as well as studies where there is very little data (older children and early adolescents). There has been a large growth in evidence linking executive functions and school based skills, so we also explore the inter-relatedness of family factors, executive functions and numeracy skills in these age groups.

Individual Contributions: Our talks start out exploring the role of familial factors and executive function in young children (Hughes & Devine) plus older children and early adolescents (Hughes et al.) from a variety of countries. The last two talks consider the how these links influence mathematics skills for young children (Blakey et al) plus older children and early adolescents (Ellefson et al.)

Paper 1

For Better, For Worse? Positive and Negative Parental Influences on Gains in Executive Function from Age 4 to Age 5

Claire Hughes *University of Cambridge* **Rory Devine** *University of Cambridge*

Objectives: Despite a flourishing literature on parental influences on children's executive function (EF), the uniqueness and specificity of parental predictors and links between adult EF and parenting remain unexamined. Addressing this gap is an important objective as there is growing recognition parental socialization involves several distinct processes.

Design and Methods: At the first of two time-points 13-months apart, 117 parent-child dyads (60 boys; M Age = 3.94 years, SD = 0.53) were filmed in two settings jigsaw, free play and the videos were coded for parents' contingent responses to children (scaffolding) and negative affect. Child EF and verbal ability was assessed at both time-points; parents completed two EF tasks and rated the home learning environment at Time 2.

Results: Parental scaffolding and negative affect showed unique and specific associations with child EF. In contrast, home learning environment measures showed global associations with child EF and VA. Poor parental EF was related to negative parent-child interactions but the intergenerational association in EF was non-significant once parental behaviours were controlled.

Conclusions: Our findings support differentiated models of parenting and indicate that parents can both help and hinder young children's growing EF skills. Improving parental EF may provide a means of reducing problems of negative parent-child interactions.

Paper 2

Associations between socio-economic status, executive functions and maths skills in a diverse sample of preschoolers

Emma Blakey *University of Sheffield* **Danielle Matthews** *University of Sheffield* **Lucy Cragg** *University of Nottingham* **Dan Carroll** *University of Sheffield*

Objectives: Executive functions, the high-level skills involved in controlling and regulating behaviour, are often found to be poorer in children from disadvantaged backgrounds. In addition, these children also tend to perform more poorly on measures of maths. We aimed to assess early associations between executive functions and maths skills in a diverse sample of preschoolers.

Design and Methods: One hundred and eighty-eight preschoolers were recruited from nurseries in diverse areas of South Yorkshire. Socioeconomic status was calculated using the postcode of the child's home or nursery school using the Multiple Indices of Deprivation. Children completed measures of short-term memory, working memory, inhibitory control and the WIAT-II maths reasoning sub-test.

Results: Regression analyses showed that socioeconomic status, short-term memory, working memory and inhibitory control were all significant unique predictors of children's maths reasoning. These associations persisted even after individual differences in vocabulary and classroom engagement scores were taken into account.

Conclusions: The results suggest a clear gap in executive functions and maths skills between children from advantaged backgrounds and children from disadvantaged backgrounds. Therefore, it is crucial that we identify ways to ameliorate this gap early in development. We will discuss potential ways that we can begin to close this gap.

Paper 3

Does Executive Function in School-Aged Children Show Culturally Specific or Universal Associations with Parenting Quality? Findings From the UK and Hong Kong

Claire Hughes *University of Cambridge* **Florrie Ng** *Chinese University of Hong Kong*
Qian Wang *Chinese University of Hong Kong* **Michelle Ellefson** *University of Cambridge*

Objectives: In a recent two-generation study of 1428 participants living in the UK and in Hong Kong (HK), we reported a cultural contrast (HK > UK) in mean performance on a battery of computerized executive function (EF) tasks that was significant for school-aged children but was not evident among their parents. The current paper builds both on these findings and on recent evidence from studies of pre-schoolers that highlight both positive and negative parental influences on child EF.

Design & Methods: For 519 parent-child dyads (mean child age =12 years, range = 9-14 years) recruited from a variety of schools in HK and UK, we collected multi-informant ratings from children and parents on three key dimensions of parenting (autonomy support, warmth and structure). Using regression analyses, we investigated each of these dimensions as predictors of children's performance on the computerised EF battery (which included measures of inhibition, working memory, cognitive flexibility and planning).

Results: Our findings indicate that variation in school-aged children's EF performance was, in both sites, associated with both parental autonomy support and structured parenting. In addition, variation EF was significantly associated with variation in parental warmth in the HK (but not UK) sample, with no significant cultural contrast in the strength of this association.

Conclusions: These findings support both the cultural universality and developmental stability of associations between parenting and school-aged children's EF and highlight the need for more in-depth work to elucidate the exact nature of family influences on children's EF.

Paper 4

Can EF explain the longstanding links between SES and school outcomes?

Michelle Ellefson *University of Cambridge* **Antonia Zachariou** *University of Roehampton* **Florrie Ng** *Chinese University of Hong Kong* **Qian Wang** *Chinese University of Hong Kong* **Claire Hughes** *University of Cambridge*

Objectives: In the fields of education, sociology and economics, there is a long-standing connection between socio-economic status (SES) and school outcomes in a wide variety of cultural settings, but these studies have yet to examine the possible mediating effects of domain-general cognitive factors such as executive function (EF). Addressing this gap was a key objective for the current study.

Design and Methods: Building on psychological studies of pre-schoolers that highlight links between EF skills and both SES and academic achievement, the current cross-cultural study used a large sample (N = 825) of 9- to 14-year-old children from Hong Kong (HK) and the United Kingdom (UK) to explore the links between SES (parental occupation and education), a standardized measure of numeracy skills (WRAT) and performance on a computerized battery of four EF tasks measuring inhibition, working memory, switching and planning.

Results: Variation in both EF and SES were, in both sites, associated with numeracy, even with effects of age controlled. However, the exact pattern of association appeared culturally specific. That is SES and EF were independent predictors of numeracy in the HK sample, but were interrelated in the UK sample, with EF skills mediating the positive association between SES and numeracy.

Conclusions: Associations between family background and children's cognitive development appear culturally specific, highlighting the need for researchers to attend to the broader social context of children's cognitive development.

Poster

Examining the influence of early touchscreen use on measures of visual attention during infancy

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Teodora Gliga *Centre for Brain and Cognitive Development, Birkbeck, University of London*
Celeste Cheung *Centre for Brain and Cognitive Development, Birkbeck, University of London*
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Tim Smith *Psychological Science, Birkbeck, University of London*

Objectives: The advent of touchscreen devices has allowed young children to begin their interaction with the digital world earlier than previously possible. Deficits in EF have been associated with early TV viewing; measures of visual attention during infancy may be predictive of later differences in Executive Functions. The current study aimed to examine the influence of touchscreen use on neural (EEG theta band activity) and behavioral measures (looking time) of attention during infancy.

Design & Methods: 56 infants took part in the 'Toddler Attentional Behaviours and Learning through Touchscreens (TABLET)' project at 12 and 17 months of age. Based on reported daily use, infants were assigned to a Low or High Usage group (e.g. less or more than 10 minutes usage per day). EEG and looking data were gathered during two presentations of a non-social stimuli. A two-way mixed analysis of variance (ANOVA) was used to examine the relationship between touchscreen use and total look duration. A three-way mixed ANOVA was used to examine the effects of touchscreen use on average theta power across different scalp locations.

Results: We found no group differences in visual attention but groups differed in the distribution of theta activity over the scalp at 17 months. In both groups theta increased with repetition of the video but in the High Usage group differences were less wide spread.

Conclusions: Differences in the topography of theta oscillations between the two usage groups may suggest more efficient attentional control as a result of early touchscreen use.

Poster

The recognition of emotional facial expressions under in-plane rotations in children with Autism spectrum disorders (ASD)

Tibor Farkas *University of Dundee* **Eleanor Bowen** *University of Dundee* **Alicia Haley** *University of Dundee* **Emese Nagy** *University of Dundee*

Objectives, Design and Method: The study tested the effects of face-inversion and in-plane rotations (from 0° to 330°, in 30°-increments) on the recognition of the six basic emotions (anger, disgust, fear, happiness, sadness, surprise, +neutral). 13 children with high-functioning ASD (CASD), 10 typically developing children (TDC) (6-13 years) and 65 typical adults (TA) were tested in a two-alternative, forced-choice experimental task, where target emotional facial expressions were to be discerned from distractors in the twelve rotation conditions.

Results: TA recognised emotions more accurately than the two child groups, whose performance was comparable. Overall, emotion recognition decreased gradually—not abruptly as suggested by previous findings (e.g. Sturzel & Spillmann, 2000)—as rotations approached full inversion. However, this pattern was more prominent in TA than in TDC, whereas the emotion recognition of CASD was considerably disorganised across rotations.

While marked inversion effects were observed in TA, inversion effects were smaller in TDC—possibly due to age differences in the use of face-processing strategies and in emotion recognition capability (Schwarzer, 2000; Thomas et al., 2007).

In contrast, inversion effects were only found in CASD when they observed negative- or more complex emotions, such as anger, disgust, fear or surprise, thereby showing evidence both for the availability of configural face-processing and for the use of feature-based strategies (Hobson, Ouston & Lee, 1988; Teunisse & de Gelder, 2003).

Conclusions: Since the use of feature-based strategies seemed to be preferred in CASD—even though configural strategies were available, as well—the study supported the weak central coherence theory (Frith, 1989; Happe & Frith, 2006).

Paper

Pathways to bullying behaviour: The longitudinal role of social experience and social understanding in early childhood bullying

Elian Fink *University of Cambridge* **Marc de Rosnay** *University of Wollongong*
Praveetha Patalay *University of Liverpool* **Caroline Hunt** *University of Sydney*

Objectives: Bullying is a significant social problem with clear public health implications. The early years of primary school provide children their first stable social context and it is here that bullying behaviour emerges. The current study aims to explore how different children come to engage in bullying behaviour by focusing on two important factors for social adaptation in children's transition to formal schooling; their social experience and theory-of-mind understanding (ToM).

Design: This study utilised a longitudinal research design with three time-points (one year apart) to allow directional associations between variables to be explored.

Methods: Participants consisted of 114 children (58 boys, Mage = 67 months) in their first year of formal schooling (T1). At Time 2 (T2) 106 children and at Time 3 (T3) 96 children remained. At all time-points children completed age-appropriate and well-accepted language assessments and ToM tasks, and peer-rated social preference scores were collected. Children reported on peers' bullying behaviour at T3. Data were analysed using path models.

Results: The specified path model fit the data well (RMSEA = .06, CFI = .98). There was a significant path suggesting that poor T1 ToM, via low T2 peer acceptance, predicts greater bullying at T3. For boys but not girls, there was also a direct path indicating high T1 ToM predicts greater bullying at T3.

Conclusions: These results indicate that there are different pathways to bullying behaviour in the early school years, and that understanding both a child's social context and understanding is critical for understanding bullying.

Paper

Asymmetries in children's thinking about the past versus the future

Áine Fitzpatrick *Queen's University Belfast* **Agnieszka Jaroslawska** *University of Edinburgh* **Eugene Caruso** *University of Chicago* **Patrick Burns** *Queen's University Belfast* **Teresa McCormack** *Queen's University Belfast*

Objectives: A number of striking temporal asymmetries have been observed in the way that adults think about the past and the future: experiences in the future are more valued than those in the past, feel closer in subjective time and elicit stronger emotions. However, little is known about the developmental trajectory of these asymmetries.

Design: The development of these temporal asymmetries was explored for the first time in two studies with children (6-7-year-olds and 9-10-year-olds) and adolescents (14-15-year-olds).

Methods: Participants were asked to make value, distance and emotion judgements about their Easter holidays (Experiment 1) or Christmas holidays (Experiment 2), either two weeks before or two weeks after the holiday period.

Results: The findings indicated the presence of temporal asymmetries in judgements from at least 6 years of age onwards. The three temporal asymmetries showed different developmental profiles. All age groups reported more intense emotion when thinking about the future than the past and reported that the future felt subjectively closer to the present than the past. However, it was only from 9-10-years of age that children valued a future experience more than a past one.

Conclusions: The underlying causes of these asymmetries are considered, as are the potential relationships between them.

Paper

A longitudinal analysis of early language delay and social competence abilities on later emotional difficulties: Evidence from the Millennium Cohort Study

Claire Forrest *University of Bath* **Michelle St Clair** *University of Bath*

Objectives: Individuals with Developmental Language Disorder (DLD) exhibit increased behavioural, emotional and social difficulties (BESDs) compared to their typically developed peers. However, the underlying pathways involved in this relationship are unclear. It may be that poor language leads to social exclusion, resulting in feelings of frustration and isolation. Additionally, previous research has focused on clinical samples which may overestimate the relationship between language delay and BESDs. Therefore, the current paper examines the mediating effect of social competence on poor mental health outcomes in a population cohort.

Design: Data from the Millennium Cohort Study (MCS) was analysed at age 5, 7 and 14.

Methods: The Language Delay (LD) group (children with parental report of difficulties or a score $-1.5SD$ on Naming Vocabulary subtest at age 5) ($n = 891$) was compared to a General Population (GP) group ($n = 13,371$). A Sobel-Goodman test was used to examine the mediating effect of teacher-SDQ Peer Problems at age 7 on the association between language delay at age 5 and parent-SDQ Emotional Problems at age 14.

Results: Peer problems at age 7 accounted for approximately 17% of the effect of language delay on emotional problems at age 14.

Conclusions: This paper supports previous findings that children with language difficulties are more at risk for peer and emotional problems. Furthermore, the findings show that peer problems partially mediate this relationship, suggesting that higher levels of social competence may offer some protection against poor mental health outcomes in those with language difficulties.

Paper

Young people's perceptions of 'Love Hurts': Is theatre an effective means of addressing teenage relationship abuse?

C.L. Fox *Keele University* **J.M. McElwee** *Keele University*

Objectives: A number of school-based domestic abuse prevention programmes have been found to be effective in bringing about attitudinal change. However, provision is patchy and there are variations in how it is delivered. The aim of the current research was to assess pupils' responses to a play called 'Love Hurts'.

Design: Mixed-methods.

Methods: An online survey was completed by 294 pupils aged 11-19 years in five schools where the 'Love Hurts' play was delivered. Four focus groups were also conducted across two of the schools involved.

Results: The majority of young people were very positive about the play, girls more so than boys. One of the strengths was that they were able to relate to what was going on. The use of theatre, they felt, helped to engage the audience with the key messages. They responded well to the use of a positive male role in the play, but felt that more could be done to highlight that women can be abusive too. Another main theme was around the issue of trust, with some young people being more cautious about entering relationships following the play.

Conclusions: The findings indicate that the young people responded well to the messages conveyed and felt that theatre was an effective means of addressing the issue. However, care is needed as to how to address the issues of gender and trust, and more thought is needed as to how to integrate these types of one-off interventions into the curriculum.

Poster

Why do mothers smoke? Exploring perceptions of nicotine usage

Suzanne Froggatt *Durham University* **Nadja Reissland** *Durham University*

Objective: Although it is established that cigarette smoking causes a range of detrimental outcomes on fetal and infant health, relatively little is known about the reasons for maternal smoking in proximity to their infant. The study aimed to assess maternal attitudes to smoking, alongside stress, depression and attachment level of nicotine and non-nicotine users.

Design: Using an independent samples design, mothers were recruited from mother and baby groups and the Durham Families Database.

Methods: Two pregnant women were recruited (nicotine user=1, non-nicotine user=1) and 16 mothers (nicotine user=5, non-nicotine user=11) with the infants' mean age 15 months (age range: 21/2 -25 months). They were tested for depression (Edinburgh Postnatal Depression Scale), stress (Perceived Stress Scale) and attachment (Attachment Scale), alongside a smoking attitude questionnaire.

Results: Significant differences in attitude to smoking in proximity of their infant were found between the two groups. Additionally, nicotine users reported more stress ($p=.013$) and depression ($p=.018$). Discriminant function analysis (Wilks's $\Lambda = .325$, $\chi^2 = 15.750$, $df = 4$, $p=.003$), resulted in one function accounting for 100% of the variance, (canonical $R^2=.822$), correctly classifying 94.4% of the sample, indicating a significantly different profile between the two groups. The correlation between outcome and discriminant function was high for stress $r=.713$, depression $r=.654$ and smoking attitude score $r=.471$.

Conclusions: Nicotine users scored higher on stress, depression and smoking attitude measures, indicating these may be contributing factors why mothers continue to smoke in the vicinity of their infant.

Poster

Preschoolers' understanding of the difference of false belief between "real child" and "fantastic child."

Fumikazu Furumi *JSPS/ Kobe University* **Megumi Masuda** *Kyoto University/ JSPS*
Masuo Koyasu *Konan University*

Objectives: We used a Smarties task to investigate if the reality of target characters affects children's false belief understanding.

Method: Sixty-two children participated in this study. During a rapport session before the main task, an experimenter asked a participant about his/her friend in the same age group at their preschool. In the main task, the experimenter showed the participant a crayon box and a paper bag and asked which the participant thought crayons were in. Then, the experimenter showed the contents: crayons were in the paper bag and marbles were in the crayon box. After the participant knew each content, the experimenter asked the participant about his/her real friend's belief. Then, a fantastic child was introduced to the participant. The experimenter showed a picture of a boy or a girl and told that he/she was at the same age as the participant. After the participant understood the fantastic child, the experimenter asked him/her about the fantastic child's belief.

Results: The younger age group (47-58 months) chose the paper bag significantly more for both real and fantastic children ($p < .05$). The middle age group (59-69 months) chose the crayon box significantly more for the real child ($p < .05$). In contrast, they chose randomly for the fantastic child. The older age group (69-79 months) chose the crayon box significantly more for both real and fantastic children ($p < .05$).

Conclusion: These results suggest that children understand the belief of the real child faster than that of the fantastic child.

Paper

"Sensory snack time" – a school based intervention addressing food selectivity in autistic primary school children

James Galpin *The Bridge, London*

Objectives: To examine the impact of a sensory based intervention to address food selectivity in autistic pupils that could be delivered in a school setting by existing staff.

Background: Feeding difficulties are twice as prevalent in autistic children as in neurotypical children. Food selectivity is the most common feeding difficulty in this population and has a significant association with disruptive mealtime behaviour. There is also strong correlation between mealtime behaviour and parental stress, parents have identified their child's diet as a priority area for support. A limited diet also has a negative impact upon nutritional intake, cognitive development and overall health.

Methods: The need for food selectivity interventions to focus on the sensory components of eating is underlined by the increasing evidence to support the causal relationship between sensory differences and food selectivity. The intervention used in the study focused on

encouraging tactile and oral exploration of foods, looking to normalise sensation, as the first of a sequence of steps to addressing food selectivity.

Conclusions: Children ate a wider range of foods, across all food groups. Scores on the Brief Autism Mealtime Behaviour Inventory (BAMBI) also significantly showed a significant improvement in mealtime behaviour. The results indicate that the sensory based intervention can successfully reduce selective eating and can be delivered by school staff to fit in with the existing school day with little disruption. Further research is needed to see if the method can be extended to larger meals and the results generalised to a home setting.

Paper

Brain space: Using instructional videos of spatial thinking to improve spatial and mathematics skills

Katie Gilligan *UCL Institute of Education* **Michael Thomas** *Birkbeck, University of London* **Emily Farran** *UCL Institute of Education*

Objectives: This study investigates the effectiveness of instructional videos as a novel method for improving spatial skills and subsequently mathematics performance in children. These instructional videos aim to teach mental rotation and spatial scaling.

Design: This study adopted a randomised control trial design. The use of instructional videos as a spatial training tool was compared to traditional spatial training (practice with feedback) and to control conditions (no spatial training). Secondly, mental rotation training was compared to spatial scaling training. These spatial measures were selected as they have been identified as important predictors of mathematics for children (6-8 years). Finally, to investigate the role of delivery mode on training efficacy, home-based participation, under parental supervision was compared to school-based participation under researcher supervision.

Methods: This study included 500 participants aged 6 -8 years. Participants completed a battery of spatial and mathematics measures both pre, and immediately post-training. These measures included: a spatial scaling task; a mental rotation task; a number-line estimation task; and a missing box calculation task. Mixed ANCOVA was used to investigate the effects of training type, delivery mode, age and participant engagement levels.

Results and Conclusions: Data collection is expected to conclude in July 2017. Findings from pilot data indicated significant improvements in mental rotation following training with instructional videos compared to control conditions ($N = 28$, $p < .05$, $d = .153$). This study will demonstrate whether instructional videos offer a fast, effective method of training spatial thinking, and whether this has knock on improvements in mathematics.

Poster

Understanding the Visuo-Perceptual Correlates of Socio-Communicative Development

Jennifer Glennon *Birkbeck, University of London* **Hana D'Souza** *Birkbeck, University of London* **Michael Thomas** *Birkbeck, University of London*

Objectives: While it has long been accepted that autism diagnoses are associated with deficits in social cognition, it is now understood that elements of visual perception, including social attention and visual search performance, are implicated also. However, what is not well understood is the relationship between social skills performance and visual perception in typical development. Here, we examine the impact of both mental and chronological age on the relationship between visual perception and social performance in typically developing children. As autistic traits are continuously distributed across the general population, we expect visuo-perceptual profiles to vary according to social performance scores.

Design: A correlational research design was employed.

Methods: Social abilities, as measured by the Social Responsiveness Scale, are examined in relation to performance on a selection of eye tracking paradigms in a group of typically developing children (n=48).

Results: Results will be discussed.

Conclusions: Our findings provide insight into the types of visuo-perceptual processes underpinning social and communication skills development in neurotypical children, thus contributing to our understanding of what 'typical' variation looks like beyond overt phenotypic expression.

Poster

Dynamic modulation of EEG theta in infants

Amy Goodwin *Institute of Psychiatry, Psychology and Neuroscience, King's College London* **Sara Jane Webb** *University of Washington* **Emily Jones** *Centre for Brain and Cognitive Development, Birkbeck University of London*

Objectives: We investigated the dynamics of infant theta power, and assessed whether change in frontal theta related to individual differences in infant effortful control.

Design: A between-subjects design was used to compare theta in 6 and 12-month old infants. This age range was of interest due to the development of effortful control across the second half of the first year of life.

Methods: Typically developing infants were recruited via a university database (N = 128; 60 6-month olds, 68 12-month olds). EEG was recorded while infants watched 1-minute videos featuring people and toys. We focused on change in theta within a video, calculated for periods where infants attended to the presentation. Theta power was analysed in an ANOVA with age and gender as between-subject variables, and video condition (people, toys), brain region, and time (timepoint within the video) as within-subject variables. Correlations were

used to investigate the relationship between frontal theta change and measures of effortful control: the gap-overlap task, and the Infant Behaviour Questionnaire (IBQ).

Results: Theta power increased during each video, an effect that was greater at 12, than 6 months. For frontal and occipital regions, change in theta was greater during videos of people, than toys. At 12 months only, frontal theta change correlated with gap-overlap RTs (disengagement effect), but not with the IBQ.

Conclusions: Understanding the neural mechanisms that underlie cognitive development is important for testing early interventions. Dynamic change in theta could possibly act as one target mechanism.

Paper

Cyberbullying victimisation in context: The role of social inequalities in countries and regions.

Anke Görzig *University of West London* **Tijana Milosevic** *University of Oslo*
Elisabeth Staksrud *University of Oslo*

Objectives: The phenomenon of cyberbullying is gaining ever more attention by media and policy makers in many countries. Theoretical frameworks using a socio-ecological approach emphasise the importance of contextual explanatory factors located at the societal level. It has been suggested that in addition to cross-national differences, the analysis of smaller units of more adjacent cultural contexts (i.e., regions) might yield more explanatory power. The current paper aims to identify and compare contextual explanatory factors associated with social inequality (i.e., crime rates, GDP, life expectancy and population density) for variation in cyber- and face-to-face bullying victimisation rates within one sample. Moreover, corresponding explanatory factors are investigated across national and regional levels.

Methods & Design: Cyber- and face-to-face bullying victimisation of 15,813 9-16 year olds (50% female) from the cross-national survey data of EU Kids Online were linked with contextual variables of 18 countries and 179 regions obtained from data of the European Social Survey. Hierarchical multilevel-modelling analyses, adding first regional then country level contextual predictors for bullying victimisation, were performed.

Results: Against expectations, differences for cyber- and face-to-face victimisation between regions within countries were smaller than differences between countries. Regional level life expectancy showed a negative and crime rates a marginal positive relation with both cyber- and face-to-face victimisation. Population density showed a negative and GDP a positive relationship with cyber- but not face-to-face victimisation. Adding predictors on the country level did not improve model fit.

Discussion: Theoretical and policy implications of social inequalities for youth' involvement in cyberbullying are discussed.

Paper

Children trust their teachers but do not retain the information in the longer term

Silvia Guerrero *UCLM* **Ileana Enesco** *UCM* **Natalia Pérez** *UCLM* **Carla Sebastián-Enesco** *ISPA*

Objectives: Several empirical studies conducted within the selective trust paradigm (Birch, Vauthier, & Bloom, 2008; Koenig, Clément, & Harris, 2004), have allowed identifying some of the variables that affect children's confidence in the source of information (e.g., the informants' expertise or past accuracy). However, only a few studies (Chan, 2011; Corriveau & Harris, 2009; Enesco, Rodríguez, Lago, Dopico & Escudero, 2016) have explored the role of a central epistemic figure during the school years: the teachers.

Design: In this research we study whether children modify their ideas because of the information provided by an expert teacher and, in case of change, if it remains over time.

Method: We tested prior knowledge of 96 children from 4th and 6th grades on concepts related to natural sciences (e.g., Do the camels carry water in their humps?), and we selected only those children who showed erroneous ideas in all concepts (N= 63). Two weeks later, their science teachers collaborated as confederate, pretending to have elaborated a text offering the correct information. After this, children were asked, "Do you think that your teacher is right?" One month later, children were assessed again to determine whether the information provided previously by their teachers produced a long-term effect.

Results: The results showed that most of the children assumed the information provided in the teacher's text, disregarding their prior (wrong) ideas. However, a month later, children tended to return to their previous wrong beliefs (e.g., camels carry water in their humps).

Conclusions: Besides the educational implications of these findings, we reflect on the limitations of the selective trust experimental paradigm.

Poster

Early functional EEG connectivity variability related to later symptom variability in autism

Rianne Haartsen *Birkbeck College, University of London* **Emily Jones** *Birkbeck College, University of London* **Mark Johnson** *Birkbeck College, University of London*

Objective: The aim of this study was to investigate functional EEG connectivity in infants at familial risk for autism and its relation with behavioural symptoms. We expected that connectivity in infants who developed autism at later age would be related to repetitive and restrictive behaviours at later age.

Design: Functional connectivity for 14-month old infants at familial risk for autism who developed the disorder at 3 years of age (N-HR-ASD = 13) was compared to connectivity for infants with low risk (N-LR = 20), infants at risk who developed typically (N-HR-TD = 47), and infants at risk who developed atypically (N-HR-Atyp = 21). Correlations between functional connectivity at 14 months and symptom severity at 36 months were also assessed.

Methods: At 14-month-old, infants watched videos while their EEG was being recorded. EEG connectivity was calculated using the debiased weighted phase lag index for the alpha frequency range (7-8 Hz). At 3 years of age, clinical outcome and symptom severity were assessed with the Autism Diagnostic Interview – Revised.

Results: Groups displayed similar levels of global connectivity at 14 months of age. For infants who developed autism at later age, functional EEG connectivity in fronto-central areas was related to the severity of repetitive and restrictive behaviours, whereas no significant correlations were found with communication difficulties.

Conclusions: The heterogeneity in alpha EEG connectivity in young infants who develop autism at later age is related to the variability in symptoms of repetitive and restrictive behaviours at 3 years of age.

Paper

The importance of pre-school transcoding skills in the development of arithmetic.

Stefanie Habermann *University College London* **Chris Donlan** *University College London* **Silke Göbel** *University of York* **Charles Hulme** *University of Oxford*

Objective: Goebel et al. (2014) found that simple number identification (transcoding from spoken numbers to Arabic numerals) at age 6 correlated highly with measures of the approximate number system (ANS). Transcoding was also powerfully predictive of arithmetic skills a year later, over and above any prediction from ANS. Questions remained concerning the influence of transcoding at earlier stages of education and development.

Design: We report results of a 25-month longitudinal study (n=100) examining the precursors of arithmetic skills in English-speaking children from 4 years of age.

Method: Predictor variables included non-verbal ability, word span, and language comprehension tasks as well as magnitude comparison for symbolic and non-symbolic stimuli (ANS tasks) and measures of spoken and written number transcoding.

Results: Structural equation path models confirmed knowledge of the Arabic numeral system at 4 years as a powerful predictor of addition as well as subtraction skills 20 months later. Neither ANS nor any other factors played an additional role in predicting early arithmetic skills.

Conclusion: These results suggest that children's ability to translate between Arabic numerals and their spoken forms plays a critical role in the development of arithmetic skills from pre-school age.

Poster

Relationships between paired associate learning (PAL) performance and arithmetic skills in primary-aged children

Lorna Hamilton *York St John University* **Ellen Taylor** *York St John University*

Objectives: Paired associate learning (PAL) is robustly associated with children's word reading, after controlling known predictors, but this relationship is specific to PAL tasks with a verbal output component. The current study investigated relationships between PAL and children's arithmetic; specifically assessing whether PAL tasks with numerical stimuli (dot numerosities) or those entailing verbal output (non-words) were better predictors of arithmetic.

Design: Three PAL tasks were designed to test children's ability to learn associations between pairs of stimuli: (a) numerosity/symbol; (b) numerosity/non-word; (c) symbol/non-word. PAL performance was used to predict scores on standardised tests of arithmetic.

Methods: Forty children were recruited from a primary school in northern England (Years 3 to 6; mean age: 9;4 years). Children completed an assessment battery comprising the PAL tasks alongside standardised tests of arithmetic, counting, dot and digit comparison, and IQ.

Results: Children across all year groups showed learning across blocks in each PAL task. Only the two PAL tasks involving verbal output were moderately positively correlated with arithmetic ($r = .47$ and $.48$ respectively). Hierarchical regression analysis revealed that verbal-output PAL explained 12% of variance in children's arithmetic scores, after controlling non-verbal IQ, magnitude comparison and counting ($F(4, 34) = 16.22, p < .001; R\text{-squared} = .62$).

Conclusions: This preliminary study suggests that PAL predicts children's arithmetic, but that this relationship is specific to PAL tasks with a verbal output component, as is the case with reading. These results highlight the key role of verbal learning in arithmetic development.

Poster

The development of a measure of children's engagement with play using toy figures

Salim Hashmi *Cardiff University* **Amy Paine** *Cardiff University* **Dale Hay** *Cardiff University*

Objectives: When children engage in pretend play, the imaginary world created is referred to as the frame (Kane & Furth, 1993). The present study aimed to develop a coding scheme to measure imaginative engagement with the play frame and assess the feasibility of its use on transcripts of children's speech and behaviour during a free play task.

Methods and design: The coding scheme was developed using transcripts from a random sample ($n=26$) of 286 participants in a longitudinal study who took part in a free play task using Playmobil figures at a mean age of 7. The coding scheme used to measure engagement with the play frame included the children's speech reflecting their management of the play, narration of stories, and enactments of roles. Transcripts were additionally coded for references to internal states of fictional characters, themes present during play and children's use of the figures (Howe, Abuhatoum, & Chang-Kredl, 2014).

Results: The most common form of engagement with the play frame was storytelling, which was positively associated with creative uses of objects ($r=.48$), the themes of play being expected ($r=.60$) and creative ($r=.40$), in addition to references to the internal states of fictional characters ($r=.64$).

Conclusions: The findings suggest that the coding scheme developed is a feasible measure for use, and that engagement in the form of storytelling is related to increased creativity during play. Future work can identify factors that lead to children becoming more engaged in play and compare their engagement with play in other contexts.

Poster

The ability to detect microexpressions amongst children with ASD and typically developing children across varied time lengths.

Rashma Hirani *Kingston University* **Elisa Back** *Kingston University*

Objective: Interpreting facial expressions is vital for successful social interaction. Therefore, studying the development of this process is key to understanding why this skill differs amongst individuals. This study investigated the processing of microexpressions of mental states across children with Autism Spectrum Disorder (ASD) and typically developing (TD) children. Presenting microexpressions of mental states is a novel addition to research and investigating the detection of microexpressions in children has not been explored.

Method: Microexpressions are defined as facial expressions that occur for a fraction of a second. This research also examined the effect of varying time lengths of Microexpressions: 40, 80, 120, 160 and 200ms on recognition. Data collected included WASI-2 IQ scores, The Autism Quotient Questionnaire (AQ) and Childhood Autism Spectrum Test (CAST). Data from an emotion recognition task was also collected from 30 children aged 6-11. 15 participants with ASD were matched with 15 TD children on Chronological age and Full Scale IQ. Participants were presented with 8 microexpressions of mental states and were asked to correctly identify them from the options available.

Results: Responses were analysed for the correct identification of these microexpressions. Accuracy rates were looked at between the varying microexpressions. The effect of the time length of these microexpressions on accurate recognition was also analysed and compared across the two groups.

Conclusions: Further investigation into the differences between individuals with and without ASD on the recognition of microexpressions will help to design the most effective interventions in teaching facial expression recognition amongst individuals with ASD

Paper

Analysis of developmental trends and cognitive strategies in a novel spatial scaling task

Alex Hodgkiss *UCL Institute of Education* **Katie Gilligan** *UCL Institute of Education*
Michael Thomas *Department of Psychological Sciences, Birkbeck College* **Andrew Tolmie** *UCL Institute of Education* **Emily Farran** *UCL Institute of Education*

Objectives: Spatial scaling involves identifying corresponding locations between two shapes of different size with identical proportions. Prior research indicates that children succeed at

simple spatial scaling tasks at 3 years with the developmental trajectory levelling out around the age of 7 years. Adults appear to use a mental transformation strategy whereby they mentally shrink or expand space, although prior research is contradictory. We developed a scaling task to further investigate the cognitive strategies used by children when scaling.

Design: Scaling accuracy and response times, for two scaling ratios (1:4 and 1:8), were compared across age groups.

Methods: Across 18 trials, 5-11 year-old children (N=298; between 19-49 per group) were shown a map, split into grid sections, one of which was shaded to indicate a target location. They were also shown four smaller maps on a computer. Each of the smaller maps also had one shaded square at different locations, one of which matched the larger map. The larger maps were either scaled 1:1, 1:4 or 1:8, relative to the smaller maps. Participants determined which smaller map contained the shaded target at the same location as the larger scaled map.

Results: Accuracy improved significantly between 5-8 years. There were no significant differences in accuracy between 1:4 and 1:8 scaling magnitudes. Response times did not differ significantly between scaling magnitudes.

Discussion: Later development of spatial scaling was apparent with this discrimination task compared with prior paradigms. Children appeared to use a relative position strategy, rather than a mental transformation strategy.

Poster

Verbal short-term memory and verbal sequence learning in typically developing 4- to 7-year-old children

Hsinjen Hsu *National Kaohsiung Normal University, Taiwan*

Objectives. Learning a language involves detecting and acquiring sequential relationships between linguistic elements. Recent studies focusing on atypical populations have found that individuals with poor language or reading abilities perform worse than controls in sequence learning. However, the relationship between verbal sequence learning and language ability has not yet been fully examined in typically developing children. The present study extends previous work by examining the relationship between verbal working memory, verbal sequence learning and language ability in children with normal language ability.

Methods. One hundred and twenty children aged from 4 to 7 years participated in the study (N=30 per age group). All the children completed a standardized language test measuring overall language ability, a verbal short-term memory task and a verbal sequence learning task.

Results. Overall, children's language ability was significantly correlated with both verbal short-term memory and verbal sequence learning. Regression analyses indicated that for the younger 4- and 5-year-old children, verbal sequence learning but not verbal short-term memory accounted for significant variance in language ability. For the older 6- and 7-year-old groups, however, a different pattern was observed: verbal short-term memory rather than verbal sequence learning accounted for significant variance in language ability.

Conclusions. The results of the current findings suggest a dynamic relationship between verbal short-term memory, verbal sequence learning and language ability in typically developing children throughout the preschool years. Possible explanations for the observed pattern of performance will be discussed.

Symposia

Maternal and Paternal Caregiving in Infancy and Toddlerhood: Antecedents and Consequences

Claire Hughes *University of Cambridge*

Theme: Family influences on children's early adjustment and development extend well beyond the mother-child relationship, but research designs often overlook non-maternal influences. A first theme for this symposium is the multi-faceted nature of early family experiences, illustrated by contrasts between:

- (i) different aspects of parenting (e.g., sensitivity and playfulness)
- (ii) mothers' and fathers' experiences of early parenthood (e.g., success in soothing)
- (iii) mothers' and fathers' contributions to infant and toddlers' development and adjustment;
- (iv) different European countries in relation to the quality of parent-infant interactions.

Objectives: A second theme for this symposium is that all the papers draw on recent findings from the New Fathers and Mothers Study (NewFAMS), a study of 460 families in the UK, USA and NL in which detailed home observations of both fathers and mothers were gathered prenatally and at 4, 14 and 24-months.

Individual Contributions: Together, the symposium papers illustrate the utility of a variety of methodologies included in the NewFAMS; from standard observational procedures such as the Still Face paradigm to novel paradigms involving Bluetooth activation of crying in a life-like baby doll, to methods that harness the power of technology to obtain comprehensive assessments of children's early linguistic environments and a novel coding scheme that captures parental playfulness to supplement well-established measures of parental sensitivity. Reflecting this diversity, the foci of these papers range from soothing to stimulation in parents and from affect to empathy in infants.

Paper 1

Distress in Dutch and British 4-month-old Infants: Reactions to Mothers and Fathers in the Still Face Paradigm

Claire Hughes *University of Cambridge* **Eleanor Steel** *University of Bath* **Wei Li** *University of Leiden* **Rory Devine** *University of Cambridge* **Judi Mesman** *University of Leiden*

Objectives: Studies of the still face paradigm (involving infants' brief psychological separation from caregivers) have focused heavily on mothers. This study aimed to compare

infants' reactions to mothers and fathers. To assess the validity of reported contrasts in happiness between Dutch children and children from other western countries, this study also aimed to compare Dutch and British babies' responses to the still face episodes.

Design and Method: 308 4-month-old first-born infants (196 from the UK and 112 from the Netherlands) were filmed in the still face paradigm with mothers and fathers in two separate home-visits, during which both parents rated their infant's temperament. International training and evaluation of inter-rater reliability was based on 60 videos sampled equally across sites.

Results: To date, 332 / 616 videos have been coded, revealing two key findings. First, parental ratings did indeed indicate that Dutch babies are happier and less prone to distress than British babies, but coding of the base-line episode showed a contrast in the opposite direction. Second, showed that babies recovered from the still face episode significantly more quickly in the reunion episode with mothers than with fathers; this contrast was similar in magnitude across sites.

Conclusion: Although Dutch fathers spend more time than British fathers caring for their young babies, fathers in both countries are significantly less experienced than mothers in soothing their 4-month-old infants. The UK-NL contrast in infant affect may reflect as yet unexamined contrasts in parental smile-eliciting behaviors.

Paper 2

How playful are parents with their infants? Developing a parental playfulness scale.

Marisol Basilio *University of Cambridge* **Ciara Laverty** *University of Cambridge* **Claire Hughes** *University of Cambridge*

Objectives: Parental play behaviours are related to child play styles (Velentino et al., 2011; Masur & Turner, 2001); and play therapy appears beneficial for children's socio-emotional development (Lin & Bratton, 2015). However, the absence of systematic measures of parental playfulness limits research in this field. This study therefore aimed to develop a new instrument to capture individual variability in mothers' and fathers' playfulness in interactions with their infants.

Design and methods: As part of the New Fathers and Mothers study (NewFAMS; PI. Prof Claire Hughes), 202 couples were individually filmed in lap play with their 4-month old infants. Alongside coding for parental sensitivity as part of NewFAMS, these 404 videos were coded for parental playfulness using a both global scale and an event /interval-based index of frequencies of play cues, types and activities. A parallel set of 392 14-month play sessions is currently being coded.

Results: The two parental playfulness scales were reliable (ICC .87 global; 83-100% interval), positively correlated (.85, $p < .001$) and distinct from sensitivity, with a negative correlation (-.45, $p < .001$). Mothers were more playful than fathers ($t(190) = -6.795$, $p < .001$), engaging in more symbolic play ($t(190) = -6.949$, $p < .001$), and demonstrating more auditory cues ($t(190) = -4.925$, $p < .001$), such as a high voice pitch, but there were significant associations between partners' playfulness (.49, $p < .001$).

Conclusions: Individual differences in parental playfulness towards 4-month-olds are substantial and distinct from variation in sensitivity. Current work coding videos at 14-months will shed light on the stability and predictive utility of these individual differences in parental playfulness.

Paper 3

Is Parents' Talk To and About their Infants Related to Depression or Couple Satisfaction?

Sarah Foley *University of Cambridge* **Elian Fink** *University of Cambridge* **Wendy Browne** *University of Cambridge* **Rory Devine** *University of Cambridge* **Claire Hughes** *University of Cambridge*

Objectives: Perinatal depression is linked to reduced sensitivity in parent-infant interaction, with long-term adverse effects on children's socio-emotional development. This study examined both depression and couple satisfaction as predictors of quality of parental talk: (a) about their infant prenatally and (b) to their infant at 6 months-of-age. Design: This is the first study to evaluate the narrative coherence of expectant parents' speech samples and to track participants across the transition to parenthood to examine early predictors of childrens' early linguistic environments, assessed via a 'talk pedometer' and related software (LENA).

Methods: Five-minute speech samples from 201 first-time expectant parents describing their future infant and relationship were coded for narrative coherence. At 6-months, a subsample of families (78 infants, 41 male, Mage = 6.99 months) wore a talk pedometer to derive total adult word count, infant vocalisations and parent-child conversational turns. At both time-points, both parents reported depressive symptoms and couple satisfaction.

Results: Although parental prenatal depression scores were unrelated to the coherence of their infant descriptions, fathers (but not mothers) who reported higher levels of couple satisfaction received higher narrative coherence ratings. Parents' postnatal depression scores were unrelated to the language environment; however, fathers' (but not mothers') couple satisfaction predicted frequencies of child vocalisations.

Conclusions: The findings support the spill-over hypothesis and, with clear implications for intervention, highlight the susceptibility of fathers' caregiving to variation in the couple relationship quality.

Paper 4

Maternal and Paternal Predictors of Internalizing and Externalizing Behaviours in Toddlerhood

Gabrielle McHarg *University of Cambridge* **Megan Cheyney** *University of Cambridge* **Freya Koutsoubelis** *University of Bath* **Sarah Foley** *University of Cambridge* **Claire Hughes** *University of Cambridge*

Objectives: Preschool adjustment reflects both children's emotional development and parental socialization; this study adopts a dual focus on parent and child characteristics to elucidate the less well understood predictors of toddler adjustment.

Design and Method: Applying both observations and questionnaires at 24-months for 150 families, we capitalize on data gathered at 4- and 14-months from a larger framing study of new fathers and mothers that includes measures of:

- i) Infant temperament and affective response at 4-months to the Still Face Paradigm.
- ii) Parental mind-mindedness, depression and anxiety (all at 4- and 14-months)
- iii) Parental personality (14-months)
- iv) Parent-rated externalizing and prosocial behaviour at 24-months
- v) Observed empathic behaviour at 24-months (Crying Baby paradigm).

Results: Analyses of data at 24-months gathered so far for 86 families show that fathers' (but not mothers') prior depression predict toddlers' externalizing behaviours at 24-months. In addition, both mothers' and fathers' neuroticism predict low levels of externalizing behaviours at 24-months.

Preliminary video-based coding confirms that toddlers vary widely in their responses to the crying baby paradigm: while spontaneous prosocial actions are rare, a significant percentage (circa 10%) appear unconcerned and most respond by concerned talk to parents. We aim to examine these responses in relation to parent-rated prosocial behaviour and callous / unemotional traits.

Conclusions: Parental personality traits and wellbeing appear related to toddler adjustment and may also explain variation in children's responses to a distress paradigm. Understanding these predictive relationships should help ensure that early interventions reach those children most in need.

Paper

Can difficulties with rule activation explain why young children engage in repetitive behaviours?

Rebecca Iversen *Lancaster University* **Charlie Lewis** *Lancaster University*

Objectives: Previous research has found a relationship between high levels of restricted and repetitive behaviours (RRBs) and poor performance on the Wisconsin Card Sort task (WCST), but not the Dimensional Change Card Sort (DCCS) task. It is not yet clear what causes this relationship. We hypothesized that the high levels of flexibility required in the WCST, as the stimuli and dimensions change at random, might explain the link with RRBs. This study adapted the DCCS to incorporate such a manipulation, through extra-dimensional shifts that involved a choice between a familiar, but previously suppressed dimension and a novel irrelevant dimension. The performance on this task was then compared with four published versions of the task, as control conditions.

Method: 139 children (m=46 months) completed one of five versions of the DCCS. Each child's RRBs were measured in a 30-item parental questionnaire.

Results: There were no differences between the 5 versions of the DCCS and each showed typical age differences between 3 and 4 years. When we regressed RRBs onto DCCS performance, there was no relationship for the 4 control conditions. However, there were significant relationships between RRBs and card sorting, as the children who struggled to activate a previously irrelevant dimension engaged in more RRBs ($r = -.398$, $n = 28$, $p = .036$).

Conclusions: The findings suggest that RRBs might reflect the child's problems with making extra-dimensional shifts, and explain why the standard DCCS has not been associated with RRBs. We discuss the developmental and clinical implications.

Poster

Set-shifting and social understanding: Can training on one improve the other in children with autism?

Rebecca Iversen *Lancaster University* **Charlie Lewis** *Lancaster University*

Objectives: Research on typically developing children has shown that training on set shifting led to improvement on the trained skill as well as false belief (FB). In comparison, training on FB produced a marginal improvement on the card sorting (CS). This suggested that executive functions and 'theory of mind' are functionally inter-related. To our knowledge the same experimental design has not been used to examine whether ToM and EF deficits are interconnected in children with autism.

Method: Fourteen children with autism and sixteen children with developmental delays were trained on the Dimensional Change Card Sort task (DCCS) or FB tasks in a pre-test, two training sessions, and a post-test. The FB training sessions consisted of one unexpected transfer story, one unexpected content story and one relative clause story. The CS training sessions consisted of three dimension and two transfer switches.

Results: Highly significant training effects were found in both groups. Additionally, crossover effects appeared as children in the CS group improved on FB ($\eta^2 = .37$, $p = .016$), and children in the FB group improved on CS ($\eta^2 = .37$, $p = .017$).

Conclusions: These results suggest a functional link between executive function and social understanding in children with autism and developmental delays. This questions the executive function and 'theory of mind' accounts of autism and suggests that these skills have a functional relationship to each other. We discuss the implications of this in terms of our grasp of these constructs and the problems faced by children with autism.

Paper

The role of broad metacognition versus socially specific metacognition in pre-school listening comprehension

Sophie Jackson *University of Roehampton* **Lance Slade** *Canterbury Christ Church University* **Joseph Levy** *University of Roehampton* **Samantha McCormick** *University of Roehampton*

Objectives: Recent research suggests that Theory of Mind (ToM) plays a role in both listening and reading comprehension. ToM tasks tap metacognitive abilities, i.e., children's understanding of how others think about something. However, it is unclear whether these abilities are somewhat socially specialised or are broader in nature. The current study compared the relative contribution of a broad range of metacognitive skills to theory of mind in their influence on listening comprehension in pre-school children.

Design: A longitudinal study examining the contribution of metacognition on listening and reading comprehension. Data from the first time-point is presented here.

Method: Pre-school children (N=216, 54% male, mean age 4;1) were given a range of metacognitive tasks, including source monitoring, metamemory and metalinguistic awareness. Theory of mind tasks were used to assess socially specific metacognition. Listening comprehension was measured using Neale Analysis of Reading Ability administered as an oral narrative. A further measure of listening comprehension (Oral and Written Language Scales) was administered to a second cohort. Measures of executive function (working memory and inhibition), and further language measures were also taken.

Results: Preliminary correlational show significant positive correlations between listening comprehension and measures of metacognition, controlling for other language measures. Further, the same pattern was found in monolingual English children, and those for whom English is an additional language.

Conclusions: The findings support research in older children showing a link between Theory of Mind and comprehension, but also suggest a broad role for metacognition rather than a socially specific one.

Paper

The rich get richer? The role of existing knowledge in learning new words

Emma James *University of York* **Gareth Gaskell** *University of York* **Lisa Henderson** *University of York*

Objectives: In accordance with dual-systems memory models, new vocabulary is consolidated off-line, particularly during sleep. Previous studies suggest that existing vocabulary knowledge might support this process. However, changes in existing knowledge and sleep architecture may mean that different mechanisms support word learning across development. We tested whether existing knowledge supports consolidation of new words in children and adults.

Design: We selected novel word stimuli with/without word neighbours in the lexicon, to contrast learning that could/could not benefit from existing knowledge. To assess changes over a period of consolidation, memory for the new words was tested immediately, the next day, and one week later.

Methods: 232 7-to-9-year-old children and 79 adults learned the novel words, and were tested using cued recall and multiple choice recognition tasks at each time point.

Results: Both children and adults showed better recall of words with (vs. without) neighbours when tested immediately after training. Importantly, only children's memory for no neighbour

words “caught up” after opportunities for consolidation. There was no correlation between existing vocabulary and overnight improvements in performance; however, an additional condition in the adult experiment showed that learning words with one single neighbour had a stronger relationship with existing vocabulary knowledge than no/many neighbours.

Conclusions: Prior knowledge influences the immediate learning of new words, but superior consolidation processes in children may facilitate learning of more novel stimuli where adults remain influenced by prior knowledge. A third experiment with children is underway, further exploring the influence of existing knowledge on the neighbour benefit.

Poster

How can a chicken sleep upside down? The influence of prior knowledge in learning novel concepts

Emma James *University of York* **Gareth Gaskell** *University of York* **Lisa Henderson**
University of York

Objectives: Newly learned words are strengthened and integrated over a period of consolidation. In line with theories suggesting schemas facilitate learning, we tested whether new linguistic information could be more readily integrated when linked to larger amounts of existing semantic knowledge.

Design: Novel concepts were created from dense or sparse semantic neighbourhoods, to test the learning of words linked to more or less existing knowledge. To allow for integration of these items into existing knowledge, we tested memory immediately, the next day, and one week later.

Methods: 50 children (aged 7-10) and 71 adults learned the novel words/concepts. Explicit memory was tested using form and definition recall tasks at each time point. A semantic categorisation task assessed whether speeded judgements benefitted from dense neighbourhoods, as apparent for known words.

Results: Word learning performance was affected by semantic density at all three time points, but reflected poorer performance to words from dense networks in either the form recall task (adults) or definition task (children). There were no reaction time benefits for dense novel words at any time point.

Conclusions: Counter to predictions, novel words from low density networks were learned better, perhaps due to less conflicting knowledge during learning. This effect persisted across the course of the experiment, but interestingly was apparent for different tasks across adults (form recall) and children (definitions). We will present data from a third experiment (underway) that will address whether these differences reflect distinct learning processes across groups or result from different levels of learning.

Paper

Prosociality in children's play: The role of touch and exertion

Megan Jefferies *University of Oxford, Institute of Cognitive and Evolutionary Anthropology* **Bahar Tuncgenc** *University of Oxford, Institute of Cognitive and Evolutionary Anthropology* **Emma Cohen** *University of Oxford, Institute of Cognitive and Evolutionary Anthropology*

Objectives: Much social interaction takes place during children's physically active play. Two elements of such play, physical activity (PA) and touch, are shown to facilitate neurohormonal bonding mechanisms and signal interpersonal intimacy in adults. However, no research has examined how children's physically active play can facilitate prosociality and bonding. In two studies, we investigated associations between PA, touch and prosociality in children's play.

Design: S1: Forty-nine children (5.2-8.6 year-olds) were observed naturalistically during school play breaks. Correlations between PA level, touch frequency, prosociality and smiles/laughter were examined. S2: In a between-subjects design, 90 children (5.25-8.5 year-olds) participated in an experiment that tested the effect of touch on helping behaviour.

Methods: S1: An observer coded PA level, touch frequency, prosociality and smiles/laughter using time sampling method for 10 minutes per child. Additionally, PA levels were measured via heart rate monitors. S2: In age- and gender-matched pairs, children played a "Shape Game", in which they placed shapes either onto each other (touch condition) or onto a board (no-touch). Subsequently, a "Fish Feeding Game" was administered to measure helping.

Results: S1: A significant positive correlation was found between PA (heart rate) and touch frequency and observed PA and smiles/laughter. S2: Preliminary results indicate 54.5% helping in the "touch" condition vs. 26.1% in the "no-touch" condition.

Conclusion: Together, these findings show how physically active play can facilitate peer bonding; children engage in more touch at higher PA levels and exhibit greater helping after play that involves touch.

Paper

EasyPeasy: the effect of a parental engagement app on parents' self-efficacy and young children's 'readiness for school'

Fiona Jelley *University of Oxford* **Kathy Sylva** *University of Oxford*

Objectives: The aim of this paper was to assess the effects on parents and children of an app that sends parents game ideas designed to boost child development and 'school readiness'.

Design: A randomised controlled trial was carried out in children's centres in an English coastal authority. Individual assignment to group was used to account for centre effects, thus boosting study power. The two arms comprised an intervention group, who had access to

the app for 18 weeks, and a 'waiting-list' control (to incentivise participation), who received the app after the post-test.

Methods: The sample comprised 144 eligible families (those with a child aged 2-6) drawn from lists held by the centres. Parents completed pre- and post-test questionnaires on parenting self-efficacy, parenting stress, and their child's self-regulation. Analyses of covariance were conducted on all outcome measures, controlling for pre-test, child's age, gender, and centre.

Results: There were significant differences in favour of the intervention group on parents' self-efficacy regarding discipline and boundaries ($F(1,67)=6.59, p=.01$), and parent-reported child cognitive self-regulation ($F(1,67)=5.43, p=.02$). Both showed moderate positive effect sizes ($g=.51; g=.44$).

Conclusions: The findings suggest a possible relationship between parents' increased consistency with rules and children's corresponding improvements in cognitive self-regulation. The promising results indicate that digital interventions may offer an innovative way to provide parenting support for preschool learning. Several limitations must be acknowledged, including the possibility of social desirability bias in subjective measurements, the high attrition rate (40+%), and the small, localised sample.

Poster

But I saw it with my own eyes!- The effects of misleading non-verbal gestures during eye-witness interviews with 5-8-year-old children.

Kirsty Johnstone *University of Sheffield*

Over the last 30 years huge advancements have been made in the field of eyewitness testimony, and support for vulnerable witnesses to give the best evidence possible is no longer secondary to that of securing a conviction. Despite the large number of studies into children's eyewitness abilities and children's performance in investigative interviews however, such studies have focused almost entirely on the power of leading verbal communication to distort witness memory. In 2015, Kirk, Gurney, Edwards & Dodimead demonstrated the 'gestural misinformation effect' whereby misleading non-verbal gestures conveyed by an interviewer were shown to corrupt eye-witness reports in 2-4 and 6-9 year old children leading to false memories. Following Kirk et al. (2015) this study tested 66 primary school children between the ages of 5-6 ($n=34$, 10 male, 24 female) and 7-8 ($n=32$, 20 male, 12 female) on the robustness of the gestural misinformation effect. The children watched a 5 minute video and were then interviewed about what they had seen. The questions were accompanied with either a misleading gesture (conveying false information), an accurate gesture (conveying correct information), or no gesture at all. Results were analysed to see how often a gesture given by the interviewer affected the child's memory of what they had seen, and compared across the 2 age groups.

Paper

Linear and U-shape Trends in the Development of Expressive Drawing

Richard Jolley *Staffordshire University* **Claire Barlow** *Staffordshire University* **Ken Rotenberg** *Keele University* **Maureen Cox** *University of York*

Objectives: This study sought to resolve the apparently conflicting age-incremental and U-shaped developmental patterns reported for expressive drawing from pre-schoolers to adults.

Design: Correlation and differences designs were employed. Regression analyses assessed linear and curvilinear relations between age and expressive drawing measures. ANOVAs assessed significant age differences.

Methods: Thirty children in each of seven age groups (4, 5, 6, 7, 9, 11 and 12 years) were randomly sampled. Two further groups (normative and artist) of 14-year-olds and young adults were included to assess expressive drawing shown late in development. Each participant (N = 314) completed three expressive drawings (happy, sad, angry) and three visual-realism drawing tasks. The expressive drawings were assessed on five measures of expressive merit (overall quality, colour, composition, line, and content) developed and scored by two adult artists. The data analyses were performed on those scores (i.e., raw scores) and those scores when statistically adjusted for performance on the realism drawing tasks.

Results: Linear trends were observed for the raw expressive drawing scores, but tailed off and declined in curvilinear relationships for the normative 14-year-olds and adults. By contrast, U-shaped curves were observed when those scores were statistically adjusted by realism drawing performance: young children and adolescent/adult sample showed elevated merit, more notably the later sample when artists were considered.

Conclusions: The findings suggest the previously reported age-incremental patterns were influenced by a consideration of realism drawing ability in the assessment, while the U-shape curve de-emphasises representational realism in the content of the drawings.

Poster

Domestic engineers: stay-at-home fathers in the 21st century

Catherine Jones *University of Cambridge*

Objectives: This study aimed to investigate male primary caregivers, to explore the experiences and parenting approaches of stay-at-home fathers. Gender role strain theory would suggest these fathers may struggle with going against the masculine ideal of fathers being financial providers.

Design: The study was a qualitative study of the experiences of stay-at-home fathers who were at-home parents primarily due to economic reasons.

Methods: The participants, 13 fathers, were recruited and interviewed at a stay-at-home father convention in the US. The interviews were analysed according to the principles of thematic analysis.

Results: Several key themes were identified in the fathers' narratives. The first theme, 'involvement', indicated the fathers' definitions of their caregiving duties included being a highly involved and nurturing parent, but they felt the approach is different from mothers'. The second theme, 'masculinising caregiving', captured the fathers' references to the pressure of upholding hegemonic masculine ideals and how many of the fathers described parenting using the language of traditional work places. Another theme, 'social isolation', encapsulated the fathers' descriptions of stigma they have experienced.

Conclusions: The study, despite a small sample, suggests gender role strain influenced stay-at-home fathers in terms of how they felt the need to masculinise caregiving, despite taking on the same duties as many mothers. The isolation theme is important as it indicates more visibility of stay-at-home fathers is needed to counteract prejudice, to encourage greater gender equality in parenting. Suggestions for changes to help stay-at-home fathers are outlined based on the fathers' own recommendations.

Paper

Impact of a video feedback intervention on parental sensitivity and communicative ability of pre-linguistic profoundly deaf and hard-of-hearing children

Meghana Kamble *University of East Anglia* **Christa Lam-Cassettari** *University of Western Sydney* **Deborah James** *University of Northumbria*

Objective: Test a proof of concept that enhancing parental sensitivity would result in increased communicative ability in pre-lingual deaf children. This study hypothesized that an evidenced based video feedback intervention for parents will enhance parental sensitivity and increase pre-verbal communication in deaf children.

Design: Data is part of a NIHR funded randomised study. The young deaf/Deaf or hard-of-hearing children and their hearing parents were concurrently recruited and stratified to either the intervention or waiting group to provide access to intervention to all, whilst providing control. Designed for maximal inclusive, sample had children with complex developmental and social needs.

Methods: Sixteen families recruited by self-selection from paediatric audiological services. Mean age of children was 2.05 years (SD= 1.77). Main inclusion criteria was child's prelingual status (<50 signed/spoken words), established from SLT reports and Vineland Adaptive Behaviour Scale. Emotional Availability (EA; maternal sensitivity, maternal structuring and child responsiveness) and Tait scale (child's communicative autonomy, no-response and communicative turns) were primary outcomes of mother-child interaction and child's communicative ability scored from 20-mins free-play recordings. MANOVA was conducted with Time (Pre/Post intervention) as repeating Factor, and EA and Tait as dependent variables, each with 3 levels.

Results: Time, all EA and Tait levels were significant except communicative Turns. Group was not significant. Tait showed enhanced child communicative autonomy and reduced no-responses.

Conclusion: Early intervention targeted at enhancing parent's sensitivity to child's behavioural cues results in significant improvement in the deaf child's communicative ability. Results highlight benefit of family centred inclusive approach.

Paper

Is two better than one? The effects of collaboration on creative drawing

Birsu Kandemirci *University of Sheffield* **Elena Hoicka** *University of Sheffield*

Objectives: The aim of this study was to look at the effects of collaboration on children's creative drawing abilities. We argued that collaborating with a friend can have an effect on young children's creativity based on their perception of peer acceptance.

Design: The study followed a within-subjects design.

Methods: The participants were 72 children (M = 6.5 years, SD = 0.56) continuing Year 1 and 2 in their schools. The study was conducted in two separate sessions (solitary and dyad sessions). The materials that were used were Torrance Test of Creative Thinking Figural Forms (form A and form B) and Peer Acceptance subtest of The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (PSPCSA). In a counterbalanced order, participants completed the drawing task alone and with a classmate. PSPCSA was always completed in the solitary session.

Results: The scoring of the drawings by independent raters is currently taking place. We are interested in the effects of collaboration on four different aspects of creativity: originality, fluency, flexibility and elaboration. We are also interested in whether participants' perceived peer acceptance rates have an effect on their collaborative performance. We will use within subject ANOVAs and Pearson correlations to analyse the results.

Conclusions: We are expecting to investigate how collaboration affects children's creative drawing abilities and whether higher levels of peer acceptance perception lead to better collaborative outcomes. The implications of the results of this study in terms of education and parenting will be discussed.

Paper

Preschool Gender-Typed Play and Adolescent Gender Development: Longitudinal Associations with Physical Aggression, Career Interests, and Sexual orientation

T.F. Karson *University of Cambridge* **Gu Li** *University of Cambridge* **Jean Golding** *University of Bristol* **Melissa Hines** *University of Cambridge*

Objectives: Various biological and socio-cognitive theories suggest that early gender-typed behaviour may predict subsequent outcomes that differ by gender. Associations between gender-typed play during the preschool period and gender-related outcomes in adolescence were investigated.

Design: Three longitudinal studies examining different gender-related outcomes, including physical aggression (Study 1), career interests (Study 2), and sexual orientation (Study 3), were conducted.

Methods: Participants were drawn from the Avon Longitudinal Study of Parents and Children (ALSPAC). Gender-typed play behaviour was assessed by a parent-reported questionnaire during the preschool period. In Study 1 and Study 2, based on preschool gender-typed play behaviour, samples of masculine (64 boys, 60 girls), feminine (80 boys, 66 girls), and randomly selected control children (55 boys, 67 girls) were recruited at age 13 years and administered self-reported questionnaires assessing physical aggression and career interests. In Study 3, participants in the full ALSPAC sample were asked to report on their sexual orientation at age 15 years. Sexual orientation data were available for 2,169 boys and 2,428 girls.

Results: In Study 1 and Study 2, feminine preschool boys and girls showed lower levels of physical aggression and were less interested in male-typical occupations at age 13 years, compared with masculine and control children. In Study 3, higher levels of cross-gender play during the preschool period were associated with increased non-heterosexuality in boys and in girls at age 15 years.

Conclusions: There is some continuity of gender typicality across developmental stages. Preschool gender-typed play may be used to study mechanisms underlying the continuity.

Paper

Parental Questioning as a Component of Innate Intersubjectivity in Early Infancy

Theano Kokkinaki *University of Crete* **Dionysia Kroustallaki** *University of Crete*

Objective: This longitudinal and naturalistic study investigated infant, maternal and paternal emotional facial expressions accompanying parental questions to infants in the course of spontaneous dyadic mother-infant and father-infant interaction in the naturalistic setting. The major hypothesis tested was that both maternal and paternal questions addressed to infants will be accompanied by emotional coordination of facial expressions.

Design: It is probable that the infant's active emotional initiatives, sensitivities and their timing are richer in the familiar environment at home where communication will have different motivation as compared to that in the laboratory with fixed arrangements for recording or testing reactions in staged performances.

Method: Participants were taken non-selectively from the Greek sample of a cross-cultural study of facial expressions of emotion accompanying spontaneous imitations in dyadic infant-parent interactions. Eleven infants were observed in dyadic interactions with their mothers and fathers during their natural interactions at home from the second to the sixth month of life. Within well-defined units and subunits of analysis, microanalysis of infant and paternal facial expressions of emotion was carried out according to the type, the frequency,

the valence and the intensity of them. On this basis, emotional coordination was evaluated with: synchrony, matching, completion and attunement.

Results: Both maternal and paternal questions to infants were accompanied by emotional coordination.

Conclusions: In the frame of the theory of innate intersubjectivity, maternal along with paternal questions addressed to infants constitute examples of intersubjectivity. The implications of these results for psychopathology, linguistics and education of infants will be discussed.

Paper

The development of funny face production in preschool children

Tatsuaki Kondo *University of Toyama*

Objectives: This study investigated how young children made funny face, and what the developmental change of funny face production was.

Designs and Method: Participants were 4-year olds (n = 38), 5-year olds (n = 39) and 6-year olds (n = 34). They were asked to make “happy”, “angry”, “sad”, “surprised”, and “funny” face. These faces were recorded on video tape. Two raters categorized what children’s face was (category scale), and evaluate how skillful their making face was (skillfulness scale). For two scales, repeated-measures analyses of variance was used to examine the effects of age and face expression.

Results: In regard to category scale, positive face (e.g., happy) was better than negative face (e.g., angry or sad). The funny face was not different from any other faces. In regard to skillfulness scale, happy and funny face were better than negative face (e.g., angry or sad). Moreover, 5- and 6-year olds tend to make funny face more skillful than 4-year olds.

Conclusions: This study suggests following three points. (1) Children can produce happy and funny face more easily than other faces, especially negative face. (2) There is no age difference in whether children can make funny face. However, (3) as age rises, they can make funny face more skillful. These findings give important suggestion for communication using the expression in preschool childhood.

Poster

Preschoolers’ play preferences when indoor and outdoor

Ekaterina Kornilaki *University of Crete* **Helen Skouteris** *Deakin University*

Objectives: In the context of an intervention programme aiming to promote healthy eating, active play and environmental sustainability, we assessed preschool children’s access to IT devices (e.g. tablets, mobiles) and their play preferences when indoor and outdoor. It was hypothesized that children would use IT devices for entertainment, but when given the choice, they would prefer active play.

Design: Data were collected in the context of a semi-structured interview with the children, while parents completed a questionnaire.

Methods: 329 Greek nursery school children aged 4-5 years were asked a series of questions about the IT devices they had at home. They were also asked questions about their outdoor activities and were asked to choose between active and inactive play activities. Parents' questionnaire entailed questions about their children's play preferences, the amount of time they spent with IT devices and the time they had for outdoor play.

Results: Children were very familiar with the IT devices and most of them had access to at least 3 devices. They used the devices to play games, watch videos and listen to music. However, when given the choice between active physical play and IT devices the majority chose active play. The analysis of parents' questionnaires is still in progress.

Conclusions: Although preschool children have access to a wide range of IT devices they still prefer active play. In a country with high prevalence of obesity, parents have to provide active play opportunities to their children as a mean to promote their health.

Poster

Materialism and its correlates in a society encountering a financial crisis

Ekaterina Kornilaki *University of Crete*

Objectives: This study aims to examine materialism in adults and its relationship with life-satisfaction, life aspirations and meaning for life. This search is of particular interest in the Greek society that is for several years under severe financial austerity. Therefore, the role of felt-economic well-being was also considered.

Design: Structured questionnaires were administered.

Methods: 140 adults (mean age of 38 years) completed a questionnaire entailing: a) the Material Values Scale (Richins, 2004) that assesses three dimensions of materialism: i) happiness – possessions lead to happiness, ii) success –possessions as a sign of success, and iii) the centrality of possessions in one's life. b) The Life Satisfaction Scale (Diener, et al., 1985), c) The Aspirations Index (Kasser & Ryan, 1996) that focuses on the relative strength of intrinsic aspirations (e.g. meaningful relationships, and personal growth) versus extrinsic aspirations (e.g. wealth and fame). d) The Meaning in Life Questionnaire (Steger, 2010) that assesses the presence and the search for meaning in life.

Results: Preliminary analysis showed that materialism had a positive correlation with extrinsic life aspirations and a negative correlation with life-satisfaction. Financial difficulties seemed to heighten materialism. The study is still in progress and further analyses are expected to reveal the relationships among the measures studied.

Conclusions: The findings of the study support previous research on the negative association of materialism and life-satisfaction. In a society facing chronic financial crisis elevated levels of materialism and focus on external aspirations can further diminish people's sense of well-being.

Paper

Development of deaf children's spelling strategies: phonological and visual accuracy

Fiona Kyle *City, University of London* **Luiza Deaconescu** *City, University of London*
Emmanouela Terlektsi *University of Birmingham* **Margaret Harris** *Oxford Brookes University*

Objectives and Design: Research into deaf children's literacy achievements has tended to focus on reading development but we know that their spelling does not seem to be as severely affected by their hearing loss as their reading ability. Analysing spelling errors can inform us about the strategies children employ when learning to spell. Here we present the results of a longitudinal investigation into deaf children's spelling abilities and the type of strategies employed.

Methods: 41 deaf and 36 hearing children (mean age 7 years) completed a picture to spelling task twice over a 12 month period. Deaf and hearing children were matched on

reading age and spelling accuracy. We used a novel combination of different methods to analyse spelling errors. Spelling errors were analysed to determine how similar they were to the target in terms of containing the correct initial letter, length, syllabic representation and also visual and phonological features.

Results: Compared with hearing controls, deaf children's spelling errors were significantly less likely to contain the correct number of syllables, correct initial letter and they were also less visually and phonologically accurate. However, the results from our novel phonological accuracy analysis revealed that deaf children's spelling errors were actually far more phonologically similar to the target than previously suggested. The visual and phonological accuracy of spelling errors improved over time in both groups.

Discussion: The findings will be discussed in terms of what this novel analysis reveals about deaf children use of phonological and visual strategies when spelling.

Paper

Self-efficacy as a protective factor for immigrant youth adaptation in Greece

Athanasios Kyritsis *University College London; National and Kapodistrian University of Athens* **Markella Xifara** *University College London; National and Kapodistrian University of Athens* **Frosso Motti-Stefanidi** *National and Kapodistrian University of Athens*

Objectives: This paper tests two main hypotheses: 1. Are immigrant status and economic hardship of the family risk factors for initial level and change in youth adaptation? 2. Is self-efficacy a promotive and/or protective factor for initial level and change in youth adaptation?

Design: This study is part of the Athena Studies of Resilient Adaptation, a longitudinal (2013-2015) project on the effects of the Greek economic crisis on immigrant adolescents and their Greek classmates. Quantitative data was collected from 14 urban schools in the area of Attica, Greece using various means and informants (student and teacher questionnaires, GPA).

Methods: The sample consists of 1,059 adolescents (565 boys and 494 girls). Their mean age at time 1 was 12.6 years, and 668 are immigrants from Albania, ex-USSR and other countries. Materials used include the Economical Hardship Questionnaire, Bandura's Self-Efficacy Scale, Rosenberg's Self-Esteem Questionnaire, the Depression Scale, Goodman's Strengths and Difficulties Questionnaire, teacher ratings on conduct and GPA. ANOVA and hierarchical regression analyses were run on SPSS.

Results: Immigrant status and economic hardship were found as significant risk factors for all adaptation outcomes. Self-efficacy predicted positively, concurrently and longitudinally, most adaptation outcomes, especially GPA. Also, self-efficacy moderated the longitudinal relation of economic hardship with GPA and with self-esteem.

Conclusions: Results emphasise the key-role of self-efficacy in promoting and maintaining positive youth adaptation, especially against socioeconomic adversity. This is particularly useful for educational and immigration policies in today's changing Europe.

Paper

Mothers' and Fathers' Perceptions of Coparenting and Marital Relationships During the Transition to Primary School

Rachel Latham *Goldsmiths, University of London* **Katharine Mark** *King's College London* **Bonamy Oliver** *University of Sussex*

Objectives: The way that couples work together as parents – coparenting – and the marital relationship are closely related yet distinct family subsystems hypothesised to influence one another. However, few studies have investigated this potential bidirectionality. We aimed to illuminate whether the quality of the earlier marital relationship is associated with the quality of later coparenting and/or vice versa. We extend the literature by focusing on the transition-to-school period; including mothers and fathers to test for parent differences; and focusing on parents of twins, an understudied population who experience greater parenting stress and marital relationship strain.

Design: Using cross-lagged models for mothers and fathers, we examined bidirectional associations between coparenting and the marital relationship during their children's transition to primary school.

Methods: Parents from 106 'intact' families taking part in the Twins, Family and Behaviour Study – a longitudinal study of UK twins born in 2009/10 – reported perceptions of coparenting and the marital relationship via telephone interview at Time 1 (M child age=4years 8 months, SD child age =4.44 months) and questionnaire at Time 2 (M child age=6 years, SD child age=6.12 months).

Results: Accounting for within-time associations and temporal stability for both mothers and fathers, coparenting was positively associated with subsequent reports of the marital relationship; there was no evidence of reciprocal associations between the marital relationship and subsequent coparenting.

Conclusions: In mid-childhood, the quality of coparenting may be a driver of the quality of the marital relationship for parents of twins. Those seeking to improve the marital relationship should pay due attention to perceptions of coparenting as children age.

Commemorative Session

The contribution of John Shotter to British (Developmental) Psychology

Charlie Lewis *Lancaster University*

In this session we reflect upon the wide-ranging contributions that John Shotter made to British psychology and to the study of human development in particular. Andy Lock starts by exploring the origins, breadth and depth of John's thinking and writing. John's continuing theoretical interest was in how we can theorize the intricately social nature of human development. Andy traces the influences of both Macmurray (1957; 1961) and Vygotsky (1962) on John's thinking. Chris Sinha delves more deeply into one of the fundamental differences between John's perspective on experience and that of contemporary psychology. Whereas the discipline is intent on reporting the repeatable in human interaction, John

focused on what makes each social interaction unique. As Chris writes: 'John's psychology is profoundly developmental, because it places centre-stage the responsiveness of the participant-observer—including the analyst—to the future possibilities inherent in a present moment that has eventuated from its unfolding in the past'. In short presentations which follow Peter Barnes, Rom Harré and Charlie Lewis will take a long view look at the place of John's thinking as teacher, thinker and in the applied work he engaged in more recently. As Rom Harré writes: 'John in his later writings had in mind a world of interactions which brought persons to life. The conversations of human kind produced their authors. This lay behind his interest in Vico and the principle that we only understand what we have ourselves produced, and that includes ourselves'.

Social understanding in children's interactions with technology

Charlie Lewis *Lancaster University*

Technology is becoming an increasing part of children's daily lives. As skilled users of iPhones and tablets we assume that this is non-problematic. In this symposium three papers present data to identify potential difficulties in preschoolers'; interactions with such technology and address its possible uses in overcoming developmental problems in understanding the social world. Paper 1 shows that in very early parent-child interactions using commercially available ebooks disrupts the turn taking sequence that is deemed to be important in early language development. Paper 2 uses the latest technology to explore the problems that preschoolers have when interacting with a robot that looks, sounds and reacts like a human agent. While both these studies show that technology may present early social-cognitive developmental challenges, Paper 3 reports the findings of an educational intervention in which purpose built software was developed to enhance young children's narrative skills and understanding of protagonists' perspectives within a story.

Paper 1

Electronic vs. paper picture book influences on joint attention in mother-infant interaction: A comparative study between UK and Japan

Ayumi Sato *Shimane University* **Tomomi Sato** *Syukutoku University* **Charlie Lewis** *Lancaster University* **Yumiko Ishikawa** *Kyoto University* **Yu Saito** *Kyoto University* **Shoji Itakura** *Kyoto University* **Etsuo Horikawa** *Kyoto University*

Objectives: Our previous study in Japan suggested that sharing an e-book with sound reduces the frequency of infants' responding to joint attention requests from the mother (RJA) and are influenced by mother's gaze pattern. Gazing patterns of adults are different between cultures, e.g., western vs eastern. The goal of this study is to compare mother-infant JA interaction between UK (western) and Japan (eastern) and to investigate whether shared e-book reading shows same pattern of JA or not.

Design & Method: Participants were 45 pairs of 12-month-old infants and their mothers (21 UK and 24 Japanese dyads). In a counterbalanced, repeated measures design we compared printed picture-book reading, electronic picture-book reading with narration sounds, and electronic one with no sound context (each respectively 3 minutes), using the same story in each medium. The videotaped mother-infant interactions were coded according to the coding system concerning the infants' RJA and initiating joint attention (IJA), developed by Osorio et al. (2011).

Results: A series of ANOVAs suggest that infant-mother RJA occurred less in the electronic book with sound than when mother and infant were sharing a paper book. In addition, there were some different effects of situations and book types between two countries.

Conclusions: In both cultures, sharing electronic picture-books with sound-effects seemed to reduce the frequency of the child's RJA. Given the increasing use of technology for infants

these data suggest that e-books with sounds may reduce the quality of early joint attention development in infancy.

Paper 2

Children's attributions of mental states in non-human agents

Shoji Itakura *Kyoto University*

Objective: This paper examines whether children's interactions with robots resemble those with other humans or are more like their approach to other objects.

Design: Two studies examine imitation and the child's appreciation of a robot's mental state.

Method 1: In Experiment 1, Fifty two-year-old children were tested to examine whether they could reproduce the target outcome of a robot in a goal reenactment paradigm developed by Meltzoff (1995).

Results 1: The results show that the children were not only able to reproduce the target action which had been produced by the robot, but were also able to complete the same task when the robot was shown to attempt, but fail, to produce the action. However, it was essential that the robot mimicked human behavior suggesting intention, such as gazing at a partner and at the object being manipulated, in order to induce children to produce the target outcome in the failed attempt condition.

Method 2: In Experiment 2, a standard False Belief Task with a robot was conducted to investigate whether preschoolers attribute the false belief to a robot or not.

Results 2: The results suggested that the children attribute the false belief to a robot but did not use not mental verb to it.

Conclusion: The studies suggest both similarities and differences in the ways in which children interact with nonhuman agents and both conclusions have implications for how we interact with non-human agents.

Paper 3

Can educational software support young child's narrative production?

Tomomi Sato *Aichi Syukutoku University*

Objective: This research explores whether technology can be used to enhance children's grasp of narrative structure and protagonists' mental states. The aim was to stimulate storytelling within an educational setting to increase event categories within a protocol and to support children's attributions of causal relationships.

Design: I developed Tablet PC software, "The adventure of PICKE", to support children's narrative production. An adult tells a child the introduction of story of "The adventure of PICKE". In this part, some accidents happen and the character experiences misfortune and troubles. The child's task is to think about how to solve these problems and how they want to

continue the story. In next stage, child tells their story to adult. Before tells their story, child considers their story by using the function of this software as below.

- Setting up picture information
- Changing facial expression of characters
- Showing animation of hint
- Showing animation of visual scene
- Changing the scene

Method: The first half of the paper describes how this software works. The second half reports on an experiment for comparing story protocol told by five-year-old children. One group used paper crafts, and the other used the system I propose.

Results: The data showed that the proposed system stimulate storytelling and increase event categories of protocol of each story. The protocols about the character's mental stage were increased especially by using function to change facial expression. Children could also use causal relation and make easy to understand stories.

Conclusion: The results suggest that software can be designed to facilitate children's production of coherent narratives and also their grasp of events and protagonists' agency.

Paper

Children's understanding of expression management in everyday emotional situations

Kirsty Lowe-Brown *University of Buckingham* **Alan Martin** *University of Buckingham*

Objectives: To investigate developmental trends in children's understanding of expression management using free verbal response methodology.

Design: A mixed method design using semi structured interviews based on hypothetical scenarios. Scenarios varied in whether the motivation for concealing emotions was implicit or explicit and for self-protective or pro-social reasons.

Methods: Scenarios, in which a character might feel an emotion and wish to conceal that emotion from another person, were presented to 128 children (58M 70F) aged 4-11 years. Participants were asked how a character might feel and look as well as how an observer would believe them to feel. Content analysis was used to group responses and frequencies of response types were investigated in relation to each scenario and in terms of overall patterns. A composite score assessing the understanding of the distinction between real vs apparent emotions and false beliefs in others was used to investigate developmental differences.

Results: Overall understanding of both the distinction between real and apparent emotions and their ability to create a false belief in an observer increased with age. Reported expression management was lower than expected, with variation between scenarios. Content analysis identified how children's interpretation of contexts may influence whether expression management is reported.

Conclusions: Qualitative methods are under used in developmental research and the results indicate how subtle differences in methodology may influence findings. Content analysis highlighted the variation in how children may interpret an emotional context and the difficulties of data reduction.

Poster

Tracking the development of social learning across domains

Jennifer Machin *Newcastle University* **Vicki Bruce** *Newcastle University* **Elizabeth Price** *Newcastle University*

Objectives: Developmental shifts in social learning are common throughout childhood. Multiple explanations for shifts in copying fidelity (CF) have been proposed. No single study has i) addressed underlying developmental influences, ii) investigated what is attended to during demonstrations, iii) explored changes in late childhood-adolescence, and iv) investigated the influence of different tasks. This study aimed to investigate the role that these influences play in shaping CF from childhood to adulthood.

Design: This experiment used a 7x2x3 mixed design. Tasks were intended to be similar to those commonly used within the social learning literature.

Methods: 126 participants, aged 3-21, underwent eye-tracking whilst viewing demonstration videos of a puzzle box task, a tool-building task, and a colouring task, in which a demonstrator performed relevant and irrelevant actions. Participants then completed the appropriate task. The number and order of actions performed were recorded. Participants also completed a theory of mind (ToM) task and one of two memory tasks.

Results: Although the tendency to overimitate was present in all age groups, imitating actions in the same order as the demonstrator increased with age. Participants who copied more attended significantly more to demonstrations. Memory performance increased with age, with higher memory scores in participants exhibiting greater CF. Participants overimitated most on the arbitrary colouring task.

Conclusions: We suggest that shifts in CF do not occur as a result of one underlying factor, but rather a combination of developmental, social, and task-related factors. Further research is required to fully investigate participants' understanding of task goals.

Poster

Drawing as an encoding strategy in young children.

Anna Macklin *York St John University* **Lauren Taylor** *York St John University*

Objectives: Drawing is an effective mnemonic strategy for adults; research investigating the impact on children's memory is limited. In the current study the effect of drawing and verbal rehearsal on primary school aged children's memory recall was investigated. It was hypothesised that children in the drawing group would recall significantly more than children in the verbal rehearsal group.

Design: A 2 x 2 between subjects design was utilised. The independent variables were: mnemonic strategy and age. The dependent variable was recall score.

Methods: Children aged 5 to 8 years old were recruited via volunteer sampling (N=28) from one primary school. They were randomly allocated to a draw or verbal rehearsal group. Six target objects were presented sequentially, after each object presentation there was a 60 second rehearsal phase (drawing or verbal). Following a filler task children were asked to verbally recall the target objects.

Results: Children in the draw group recalled significantly more objects than children in the verbal rehearsal group. Age did not affect recall scores.

Conclusions: Drawing appears to be an effective mnemonic strategy for children. Evidence for picture superiority and depth of processing are discussed alongside the application of drawing to educational activities.

Poster

Are bystander intervention programmes effective in tackling sexual violence in emerging adults?

Anna Macklin *York St John University* **Nathalie Noret** *York St John University*
Nicholas Streatfield *York St John University*

Objectives: There has been growing concern regarding the culture of sexual violence during emerging adulthood. Bystander intervention programmes have been proposed as effective strategies in promoting behavioural change and challenging social norms. The present study aimed to evaluate the effectiveness of one such programme, the Intervention Initiative (TII), in enhancing bystander behaviours.

Design: The current study employed a within subjects design, and data relating to Social Norms and Bystander Self-Efficacy were collected at three time points.

Methods: Participants (N=30) volunteered to take part in TII. The programme was evaluated using the Social Norms and Bystander Self-Efficacy questionnaires at pre, mid-point and post programme completion. The survey also included open questions focusing on reasons for volunteering, and the impact of the programme on bystander behaviours.

Results: Findings of the data analysis highlight an increase in bystander self-efficacy over the course of the programme, and improved social norms related to gender and sexual violence.

Conclusions: TII is an effective programme to change social norms and empower young people to become active bystanders. Routine Activity Theory proposes that bystander programmes are effective as they encourage and strengthen guardianship. Implications for educational settings and the development of transferable skills are discussed.

Paper

Deconstructing the Enactment effect: Relational processing benefits from enactment but this effect is mediated by probe type

Angie Makri *University of Bristol* **Chris Jarrold** *University of Bristol*

Objectives: When compared to verbal learning, enactment has been shown to facilitate memory performance for short action-object sentences in children. Although enactment has been found to lead to superior item-specific processing, it does not benefit relational processing. These effects have been studied for whole phrases but the effects of enactment for the individual features of sentences (action-object) remain unknown. This project aimed to investigate separately children's memory for actions and objects in two different encoding conditions (enactment-verbal). The second aim was to examine item and relational processing as a function of probe type (action-object) and encoding condition (verbal-enactment). Based on previous findings, it was hypothesised that enactment would facilitate item-specific processing for objects while relational processing would benefit from enactment but only for the action stimuli.

Design: The study employed a 2 (enactment or verbal encoding) by 2 (recognition or reconstruction) x 2 (action or object memory) repeated measures design.

Methods: Thirty-four children (Mean age = 8.05, SD = 0.63) were randomly selected from the university database. Eight foam objects and eight action words were used as the stimuli during encoding. Participants responded by clicking the correct items on a computer screen.

Results: The findings suggest that overall, enactment encoding did not lead to superior item or order performance. However, a significant interaction between encoding mode and probe type revealed that enactment facilitates relational processing but only for the action items.

Conclusions: Enactment benefits relational processing but this effect is specific to action-related words.

Paper

Embodied cognition and children's STEM learning

Andrew Manches *University of Edinburgh* **Sara Price** *University College London*

Purpose: In this talk, we share the theoretical grounding and methodological lens of several funded projects (ESRC/EPSRC/Wellcome/NSF) examining the role of multimodal interaction in conceptual development from an embedded and embodied paradigm of cognition.

Background: With roots in Descartes' dualism, the separation between mind and body is integral to everyday language, permeating much educational and psychological discourse. Deep conceptual thinking in various subjects, notably Mathematics or Science, is typically framed as being located in children's brains, not their arms and fingers. Embodiment is an epistemological position that challenges this mind-body distinction by proposing that the relationship between cognition and action is inseparably linked: thinking activates prior sensorimotoric routines.

Methods: From an embodied perspective, children's multimodal interaction offers a lens into how the socio-technical environment supports cognitive activity. Moreover, examining the way children subsequently express their thinking in the absence of relevant stimuli (e.g. gesturing, metaphorical language) enables us to draw inferences about what types of sensory and action experiences may have been internalised. By drawing upon recent work in this field, alongside our findings across projects, we discuss the notion of 'concept alignment' in response to questions about what forms of sensorimotoric experiences most benefit children. Such work is important to protect against loose pedagogical interpretations of embodied cognition as generally advocating action experiences.

Conclusions: In our talk, we discuss the implications of this work for theories of cognitive development, as well as the practical implications of this work, namely in the design of sensory and action experiences to support learning.

Paper

The effect of classroom noise on creativity in primary school children.

Jessica Massonnié *Birkbeck, University of London* **Catherine Rogers** *Birkbeck, University of London* **Denis Mareschal** *Birkbeck, University of London* **Natasha Kirkham** *Birkbeck, University of London*

Objectives: Classroom noise comprises a mix of voices, movement noise and background noise from cars and machines. Following adult findings[1], we investigated whether this type of noise promotes children's creativity, and whether this effect depends on general cognitive skills and executive functions[2].

Design: Participants performed two creativity tasks twice: once in silence, and once with 65dB of classroom noise, as well as a battery of cognitive tests in silence.

Methods: Twenty-six participants (mean age: 7:7 years-old, range: 4:11 to 11:4 years-old) were tested. Children were prompted to find unusual uses of a pencil/bottle (AUT) and to suggest consequences of two imaginary situations (JS[3]). The number of ideas (fluency), categories (flexibility) and originality were measured. General abilities included vocabulary[4] and nonverbal relational reasoning[5]. Executive functions assessments focused on inhibitory control (animal Stroop, Flanker tasks[6]), visuospatial and verbal working memory.

Results: Repeated measures ANOVAs indicated no main effect of noise on creativity, but an interaction with age for originality for JS, and flexibility for the AUT, with older children less impaired by noise. Linear and quadratic regressions showed that, beyond the effect of age: flexibility in the AUT was better in silence only for children with low or high Stroop interference; flexibility and originality in the AUT were better in noise for children with low and high verbal working memory; better visuospatial working memory was associated with better originality in noise for JS.

Conclusion: Results indicate that noise can affect children's creativity only above a certain level of disturbance[1].

Paper

Olfaction in ASD and the Broader Autism Phenotype

Jennifer Mayer *University of Roehampton* **Jonathan Silas** *Middlesex University* **Paul Dickerson** *University of Roehampton* **Margot Crossman** *University of Roehampton*

Objectives: Sensory atypicalities in Autism Spectrum Disorders (ASD) are now included within the diagnostic criteria for ASD in the DSM-5 (APA, 2013). Recent research has also shown that sensory atypicalities are correlated with ASD traits in the neuro-typical population (Horder, Wilson, Mendez, & Murphy, 2014; Mayer, 2017; Robertson & Simmons, 2013), demonstrating that sensory atypicalities characterise the broader phenotype of the disorder in the typical population. However, commonly overlooked in the sensory processing profile of ASD, or ASD traits in the typical population, is the processing of olfactory stimuli. The few studies that have investigated olfactory functioning in ASD have reported mixed results, perhaps due to the inherent heterogeneity in ASD symptomology and the small sample sizes used in the vast majority of these studies.

Design: The present talk will address a series of studies investigating olfaction in ASD and the broader autism phenotype.

Methods: The first study investigated olfaction identification and thresholds in 18 high-functioning adults with ASD and 15 typically developing adults. The second study investigated olfaction identification in relation to the broader autism phenotype in 749 typically developing children and adults, recruited as part of a large-scale research study at the London Science Museum.

Conclusions: The results of these two empirical studies will be discussed in the context of a meta-analysis of 10 studies that have investigated olfaction in children and/or adults with ASD. These findings shed light on the relationship between olfaction functioning, sensory atypicalities, and autistic symptomatology in ASD and the broader autism phenotype.

Poster

Effortful Control and the Vicarious Learning of Social Anxiety

Charlotte Mills *University of Surrey*

Objectives: Since social anxiety negatively correlates with effortful control (EC), this study examined social fear learning between high and low EC groups. It also considered whether disassociations between perceived and actual heart rate reactivity found in anxiety literature were reflected in low EC participant's responses.

Design: Study design was based on three previous research studies of vicarious fear learning of social anxiety and animal phobia (Askew and Field 2007; Askew, Haged, & Morgan, 2015; Reynolds, Field, & Askew, 2014) providing cognitive, physiological and behavioural fear response measurements.

Method: A community sample of 36 participants (aged 9-11 years) completed a behavioural measure of EC, and social anxiety and anxiety sensitivity self-reports. Prior to a social performance task, participants watched one of two films of a peer's embarrassing or neutral kazoo playing performance. Participants were asked to also record a kazoo tune on video to

be shown to peers. Self-report perceived heart rate on a visual analogue scale and actual heart rate responses were taken at baseline and task. Approach/avoidance behaviour was indicated by time taken to press record on a remote control.

Results: Pearson product-moment correlations and ANCOVA analyses found high EC participants responded in the negative film condition with significantly less perceived heart rate reactivity than low EC participants, despite significantly higher actual heart rate responses.

Conclusions: Initial results from this ongoing study suggest vicarious learning increases anxious social threat responses and that EC potentially protects against attending to physiological cues and associating heart rate reactivity with threat.

Paper

Local and global processing in maths and science achievement at primary school

Su Morris *UCL Institute of Education* **Iroise Dumontheil** *Birkbeck, University of London*
Emily Farran *UCL Institute of Education*

Objectives: There is evidence to suggest that those who have a local processing preference and those who are more field independent, are more likely to study or work in science, technology, engineering, and maths (STEM). However, the direct association between visual perceptual processing and ability in STEM has not been fully explored. This study examines the relationships between global/local processing, field dependence/independence (FDI), and maths and science achievement in children.

Design: This is a cross-sectional study, enabling comparisons to be made across age groups.

Methods: 135 children in years 1, 3, and 5 (aged 5-6, 7-8, and 9-10 respectively) were tested at school. They completed 18 tasks assessing their visual perceptual processing, maths and science ability, and general abilities. All tasks were verbally administered to individual children in four sessions.

Results: After controlling for age, this study found no association between global/local processing and maths and science. However, there was a significant, positive correlation between FDI, and science and maths, which remained after controlling for age. After controlling for IQ, working memory (WM), and age, FDI uniquely predicted a small but significant amount of numerical operations and science scores.

Conclusions: The ability to separate detail from context is strongly associated with maths and science achievement. This study replicates and extends previously-found associations between FDI and academic achievement. We demonstrate that these associations are largely due to the domain-general factors inherent in FDI such as IQ and WM, rather than the domain-specific perceptual processes of FDI such as global/local processing.

Paper

Living in a scenic environment positively influences wellbeing in adolescence beyond the effects of urbanicity and greenspace

Abigail Mottershaw *University of Bristol* **Oliver Davis** *University of Bristol* **Claire Haworth** *University of Bristol*

Objectives: Environments of high natural beauty positively influence wellbeing in adults, though little is known about the effect in adolescence. We explored the impact of living in a scenic environment on subjective health and wellbeing in adolescence, controlling for greenspace and urbanicity.

Design: Wellbeing data were collected within the Twins Early Development Study (TEDS), a longitudinal cohort study of a representative sample of twins born in England and Wales between 1994 and 1996. Data from TEDS were matched to publically available environmental data making this analysis possible on a large sample, unbiased by self-report.

Methods: Measures of life satisfaction, subjective happiness, and subjective health were collected using questionnaires from 10,915 16-year-old individuals. We used scenic data collected online via Scenic-Or-Not; percentage of greenspace data from the 2001 Generalised Land Use Database; and urbanicity classification from the 2011 Rural Urban Classification for small area geographies. We ran regressions to establish the effect of the scenic level of the environment on wellbeing for 1–20km radii areas around each family's location, after controlling for greenspace and urbanicity.

Results: We found living in a scenic environment had a positive influence on wellbeing, beyond the effects of greenspace and urbanicity. The largest effects were on adolescents' perception of how much they like where they live, and that there are fun things to do.

Conclusions: Scenic environments may mitigate the negative effects associated with rural living in adolescence. With increasing urbanisation, we should aim to make urban environments more aesthetically pleasing, not just greener.

Paper

Spilling the beans: How food advertising influences adolescents' self-presentation and peer evaluation in social media

Grainne Murphy *University College Dublin* **Mimi Tatlow-Golden** *The Open University*
Barry Sheppard *University College Dublin* **Emma Boyland** *University of Liverpool*
Brendan Rooney *University College Dublin*

Objective: Adolescents have a developmental need to establish their identity; qualitative studies report they use unhealthy foods to do so. In a context of high overweight/obesity, and meta-analytic findings indicating that unhealthy food advertising affects food preferences and consumption, this study examined adolescents' self-presentation, and peer evaluations, in social media, using marketing for unhealthy foods, healthy foods and non-food items.

Design: A 3x3 factorial design. Independent variables were (i) unhealthy, healthy, non-food advertisements; (ii) the source of advertisements—peers, celebrities or food companies. Dependent variables were (a) participants' ratings of peers and (b) participants' preference for sharing such advertisements on their personal profiles.

Methods: Young people (13-14 years, N=72) viewed 36 images, created to resemble Facebook News Feeds of fictitious peers. Each included two distractor images plus one target image of an unhealthy, healthy or non-food item, presented to them by peers, celebrities or companies.

Results: Data were analysed with two generalised log linear mixed models. Participants rated peers with unhealthy foods on their News Feeds significantly more positively than those with healthy foods, $F(2, 636) = 5.84, p < .01$; and would share unhealthy advertising on their personal profiles significantly more than healthy advertising, $F(2, 636) = 90.09, p < .001$.

Conclusions: In early adolescence, young people employ unhealthy food advertising to self-present, and to assess their peers, significantly more than advertising for healthy food or non-food items. These findings indicate the need to regulate food advertising in social media, going beyond the recently introduced UK Committee of Advertising Practice guidelines.

Symposia

Developmental origins of intersubjective awareness: From fetus to infant and models for autism

Emese Nagy *University of Dundee* **Helen Marwick** *University of Strathclyde*

The aim of the symposium is to explore the developmental origins and unfolding of intersubjective awareness from fetus to infant, followed by investigations in autism.

Viola Marx presents evidence for fetal responsivity to maternal stimulation, measuring behavioral responses of 28 fetuses. The results point to the evidence for a responsive awareness in fetal life, dependent on the developmental stage of the fetus. Emese Nagy explored intersubjective awareness in the human neonate with data on newborns' voluntary adaptive engagement in imitative setting and their sensitive responding according to the intention of the interactional partner.

Helen Marwick reports an international study on the intersubjective experiences of children in nursery settings and the supportiveness of an out-of-home setting in establishing positive interactions and attuned engagement.

Karena Jarvie examines intersubjective experience of children with ASD within joint-play through professionals' accounts of shared understanding and emotional connection experienced with the child, and the development of co-created pretence and symbolic representation. The results offer insight into the intersubjective processes supporting symbolic representation in children with autism.

Tibor Farkas explored socio-emotional relating in autism via imitation of facial emotional expressions. He found no evidence for pervasive deficits, rather, the nature of the difficulties to stem from reduced intersubjective awareness.

Finally, Claire Cassidy examines intersubjective experience of children with autism participating in philosophical enquiry. Using teacher diaries and observations, she examines the processes of intersubjective connection argued to underpin perspective-taking, and interpersonal understanding demonstrated by the children.

The papers are integrated by Vasudevi Reddy discussing intersubjective awareness.

Paper 1

What happens when the mother touches her bump? Fetal behavioral responses to the differential tactile stimulation of the maternal abdomen, a frame-by-frame analysis

Viola Marx *University of Dundee*

Objectives: The present project examined whether fetuses respond to the touching of the mother's abdomen, and if they do, whether they differentiate based on familiarity and the source of the touch, utilizing 3D real-time (4D) sonography.

Design and Methods: Behavioral responses of 28 fetuses (20th to 33rd week of gestation; N=15 in the 2nd and N=13 in the 3rd trimester) were frame-by-frame coded using a coding system comprising 20 codes and were analyzed in four conditions, during the touch of the (1) mother, (2) the father, (3) the stranger and in a (4) no-touch, control condition.

Results: Results indicated fetuses' differential responses to the touch. In particular, the duration of their reaching out to touch the uterus wall, and self-touch was different across the four conditions dependent and dependent on the gestational age of the fetus. When the mother touched, fetuses in the 3rd trimester touched the uterus wall significantly longer than fetuses in the 2nd trimester did, compared to the control condition. At the same time, fetuses in the 3rd trimester also touched themselves less during the mother's touch, compared when the stranger and the control conditions.

Conclusions: Older fetuses' differential response to the touch of the mother's abdomen might be due to the maturation of the central nervous system, and may indicate the emergence of a proprioceptive self-awareness by the 3rd trimester.

Paper 2

Conscious engagement in the newborn infant

Emese Nagy *University of Dundee*

Objectives: It has been suggested that neonates possess a 'minimal level' of consciousness (Lagercrantz, 2014) originating from the cortex. Studies from our laboratory addressed the possibility of a more complex intersubjective engaged awareness in the human neonate.

It has been suggested that if neonates imitate, they do so because some gestures are more easily triggered, but innate releasing mechanisms, innate motor schemes, learning mechanisms theories also have been proposed.

Design and Methods: Study I, with forty-two (0-3 days) newborns, using frame-by-frame microanalytic methods examined how imitation of four gestures; the tongue-protrusion, 'looking-up' and three-finger and two-finger gestures unfolded over time.

Results: All four gestures were imitated. The temporal analysis showed that response latencies were variable and from seconds to minutes and that complex movements were broken up sequentially. Perinatal imitation was found to be a non-reflexive response involving intentional, voluntary responses.

Design and Methods: Study II examined 75 newborns (0-7 days) for the imitation of the 'looking up' gesture in two postural positions (lying versus sitting) in relation to the model. Results: The results showed that newborns not only imitated the gesture but prioritized the imitation of the direction, thus the goal of the model when the direction and the movement patterns were dissociated.

Conclusion: Neonatal imitation likely reflects a conscious adaptive behaviour of the perinatal infant. They responded according to the nature of the stimulus, sensitive to the intention of the interactional partner. Their responses indicate their active engagement and intersubjective awareness.

Paper 3

Intersubjective experience in very young infants in group based nursery settings: an international study

Helen Marwick *University of Strathclyde*

Objective: This international study involves seven different countries and examines the intersubjective experiences of young children in group based nursery settings to investigate the supportiveness of an out-of-home setting in establishing sustained positive interactions and attuned engagement for very young children. Attendance at out-of-home childcare settings for children under three years old is increasing (OECD, 2015), and it is of paramount importance that the experience of young children in an early years setting should optimally support their development and well-being.

Methods/Design: The study involves interviews with parents and nursery staff before, during and after the first months of transition of a young 'focus' infant aged under one year into a nursery setting, plus observation of the infant in each nursery in a range of interactions across a year. Several focus children are being followed in each country.

Part of the data gathering involves observation by eye across the day. One set of observational categories is for type of activity context – with categories such as: solo, one-to-one with adult, one-to-one with other child, group activity with adult, paired activity with adult and general proximity of adult. A second category set has quality of engagement categories, rated on a 5 point scale including: involvement, 'activeness' (level of activity), interpersonal engagement, playfulness, and overall positive mood and well-being (Marwick et al, 2013).

Results/Conclusion: This paper presents early ongoing results from this observational analysis in two countries and offers initial and informative insight into the scope of positive intersubjective experience of young infants in nursery settings.

Paper 4

Intersubjective connection and co-creation in symbolic play and emotional interaction in young school age children on the autism spectrum

Karena Jarvie *Children & Families, City of Edinburgh Council*

Objective: This paper examines the process of intersubjective experience of children with an autism spectrum disorder and their play partners within a joint-play context, which has been shown to be of value in the demonstration of symbolic play abilities in young school-age children on the autism spectrum.

Research has reported that symbolic play abilities in children with autism can be supported by focused interaction with a trained play partner, indicating that the processes underpinning such abilities are able to be developed through engaged interaction, and that lack of demonstration of symbolic representation for children with autism can be considered to reflect altered performance abilities rather than altered competence.

Methods/Design: This study involves seven children with autism, aged 5-8 years, who participated in weekly sessions using the Playboxes joint play intervention (Marwick, 2006) over a period of 3 months. Professionals working with the children incorporated Playboxes into their practice. Pre and post standardised assessment showed that every child gained increased age-equivalent Test of Pretend Play scores, ranging from +8 to +30 months. Part of the data gathering involved the professionals systematically noting change and development across the sessions in mutual engagement, communication, and intersubjective connection.

Results/Conclusion: This paper presents the professionals' accounts of the development of shared understanding and emotional connection which they experienced over the sessions with the child, and the ongoing development of co-created pretence and symbolic representation which they observed in the child. The results offer insight into the intersubjective processes by which symbolic representation is supported in children with autism.

Paper 5

Atypical facial emotion imitation in high functioning children with Autism spectrum disorders (ASD): Missing style, missing social motivation?

Tibor Farkas *University of Dundee*

Objectives, Design and Method: The study tested overall imitative behaviour, and the dynamics and style of the imitations (strong versus subtle depictions) by comparing performance on emotional facial expressions (reflecting anger, disgust, fear, happiness, sadness and surprise, +neutral), non-emotional facial- and bilateral bodily actions/movements in 19 high functioning children with ASD(CASD), 15 typically developing children(TDC) (12-16 years) and 29 typical adults(TA). These stimuli were presented in short video clips, specifically developed for the present study, and they were found to be suitable

for inclusion with a series of pilot studies. Participants' imitations were video-recorded and they were rated on intensity by a group of independent raters.

Results: The imitations of CASD were less intense than those of TDC or TA only when they copied emotional facial expressions but not when they reproduced non-emotional facial- and bodily actions. Only for the imitation of emotional facial expressions, CASD were less able to copy the style of the presented actions than the two neurotypical groups, as they showed particular difficulties on reproducing strong expressions. The performance of TDC and TA was comparable across conditions; hence, the ability to imitate these behaviours did not seem to change past the adolescent age.

Conclusions: Since the imitative difficulties in CASD were not pervasive, as they only affected emotional facial expressions, the findings indicated specific difficulties with stimuli, which embodied social/emotional dimensions, as well. Therefore, the study's results were consistent with the notion of reduced social motivation for-/interest in intersubjective behaviour (Hobson & Lee, 1999; Hobson & Hobson, 2008).

Paper 6

Intersubjective philosophical connection in young school age children on the autism spectrum

Claire Cassidy *University of Strathclyde*

Objective: This paper examines the intersubjective experience of young school-age children with autism while participating in philosophical enquiry with other children.

Community of Philosophical Inquiry (CoPI) aims to develop interpersonal understanding and perspective-taking through facilitated, structured dialogue, has been shown to be effective as an inclusive pedagogical approach by which to support the communicative interaction and opportunities for collaborative dialogue for children with social, emotional and behavioural needs (Cassidy and Marwick, 2017). It has been argued that the structure and predictability of the approach reduces social demand and supports emotional regulation. This previous work involved seventeen children with ASN from the two mainstream classes in two separate schools, and included 3 children on the autism spectrum. It was notable that the children with autism showed high levels of engagement, relevant verbal participation and patience within the approach, despite the understanding that such an approach might constitute something of a challenge to children on the autism spectrum as the approach requires perspective-taking and reciprocity in conversation.

Methods/Design: Using teacher diaries completed during the intervention process, and teacher observations of the transfer of perspective taking abilities and reciprocity to other activities outwith the CoPI sessions for the children on the autism spectrum, this paper examines the processes of intersubjective connection which can be understood to underpin the engagement and interpersonal understanding demonstrated by the children.

Results/Conclusion: Results indicate the pivotal importance of structured interaction in supporting processes of perspective-taking, interpersonal understanding and generation of social communication or children with autism.

Paper

Does perceived social support moderate the relationship between peer-victimisation and adjustment?

Nathalie Noret *York St John University/ Strathclyde University* **Simon Hunter** *University of Strathclyde* **Susan Rasmussen** *University of Strathclyde*

Objectives: Although the relationship between peer-victimisation and adjustment is well established, not all victims develop negative outcomes. The transactional model of stress provides a useful framework for examining such individual differences. Specifically, previous research supports the notion that secondary appraisals of available social support may buffer the relationship between peer-victimisation and symptoms of depression and anxiety. However, research exploring the buffering role of perceived social support in the relationship between different types of victimisation and adjustment is limited. Therefore, the aim of this study is to examine whether perceived social support moderates the relationships between peer-victimisation and adjustment, and between cyber-victimisation and adjustment.

Methods: Data were collected using an online survey. The survey included a measure of peer-victimisation, the short 12-item version of the General Health Questionnaire, and questions relating to perceptions of social support. In total, 2,196 year 8 pupils (aged 12 and 13) participated in the survey, from nine English secondary schools within one local authority region.

Results: Perceived social support moderated the relationship between peer-victimisation and adjustment, but not between cyber-victimisation and adjustment. Peer-victimisation predicted poorer adjustment in those with, but not in those without, perceived social support. Cyber-victimisation predicted poorer adjustment in both those with and without perceived social support.

Conclusions: The findings will be examined in the context of the transactional model of stress and current research on the relationship between peer victimisation, perceived social support, and adjustment. Implications for future research and intervention programmes will be discussed.

Symposia

Mathematical Reasoning and Mathematical Development

Terezinha Nunes *Department of Education, University of Oxford*

Theme: The theme of this symposium is the significance of reasoning for learning mathematics in school. Many developmental psychologists have disputed the results of Piaget's studies of children's reasoning but few have disputed his hypothesis that reasoning plays a crucial role in learning mathematics. Yet the evidence to support this accepted wisdom is scarce.

Objectives: This symposium aims to offer evidence for the causal role played by reasoning in learning mathematics in school, through longitudinal and intervention studies using randomised controlled trials. Barros' longitudinal and predictive study demonstrates that it is possible to separate quantitative reasoning and arithmetic abilities using factor analysis.

Reasoning is a better predictor of performance in a fractions test than arithmetic; both abilities contribute independently to this prediction. Paxman's reasoning intervention to improve children's estimation on the number line shows a positive trend and does not reach significant results, but it suggests that reasoning about the position of numbers might be an effective way to improve number line estimation. Thus number line estimation may not be a perceptual task, as it is sometimes argued. Zheng's intervention to improve children's understanding of the inverse relation between addition and subtraction supports a causal connection between inversion reasoning and arithmetic learning. Nunes et al.'s large randomised controlled intervention trial showed that teachers who dedicated one hour a week for 12 weeks to promote children's reasoning, instead of teaching the usual numeracy programme, improved their children's mathematical attainment by an extra three months, in comparison to a control group.

Paper 1

A longitudinal study of reasoning and arithmetic predicting fractions learning

Rossana Barros *Department of Education, University of Oxford* **Terezinha Nunes**
Department of Education, University of Oxford

Objectives: The aim of this study was to test whether quantitative reasoning and arithmetic make independent contributions to the prediction of children's attainment in a measure of knowledge of fractions.

Design: The design is longitudinal and includes a control for non-verbal reasoning.

Methods: At the end of Year 4, participants (105 children from six schools) completed the quantitative reasoning and arithmetic measures plus the Raven's matrices test. After receiving instruction on fractions in Year 5, they completed the fractions measure (12 months later), adapted from the Chelsea Science and Mathematics Study.

Results: Confirmatory factor analyses were carried out to assess whether the quantitative reasoning and arithmetic scales measure distinct competencies. A two-factor analyses showed a better fit than a one-factor analysis. Hierarchical fixed-order multiple regression analyses were carried out to test whether quantitative reasoning and arithmetic made independent contributions to predicting children's attainment in the fractions measure, after controlling for age and non-verbal reasoning. Age was not a significant predictor.

Quantitative reasoning and arithmetic made independent contributions to the prediction of fractions scores, even after controlling non-verbal reasoning ($\beta = .21$); the contribution of reasoning ($\beta = .49$) was more important than that of arithmetic ($\beta = .325$). The three predictors explained 76% of the variance.

Conclusions: There is clear justification for distinguishing mathematical reasoning from arithmetic skills; thus it is not realistic to expect children to apply arithmetic to quantitative problems without appropriate instruction. Quantitative reasoning plays a crucial role in preparing children for learning about fractions in school.

Paper 2

Meet me half way: teaching estimation on the number line

Tara Paxman *Department of Education, University of Oxford*

Objective: This study aimed to test whether there is a causal connection between estimation on the number line and number sense. Number line estimation correlates with number sense tasks, but evidence for a causal connection depends on demonstrating that interventions that improve estimation also improve number sense.

Design: This design experiment included a pre- and a post-test with random allocation of participants to the intervention or the active control group. Design experiments allow for improvements in the intervention during implementation when no previous intervention was found effective in improving the target ability.

Method: Pre- and post-test measures were a number-line estimation task and number sense items from two measures. Participants (N=42; aged 7-8 years) were selected from four classes after the pre-test placed them below the 50th percentile in their classes; random allocation followed the pre-test. Training focused on reasoning about the estimation using four reference points ($1/4$, $1/2$ and $3/4$) on the line. Children attempted to "spot the enemy" in different spy games.

Results: Greater improvement on estimation was noted in the intervention group, but an ANCOVA with pre-test scores as covariate showed that the difference between the groups was not significant; however, a trend ($p=.07$) was observed.

Conclusion: As no significant intervention effect was found, it was not possible to test the causal hypothesis. During the intervention implementation, changes in item presentation and feedback were made, resulting in improved performance during training; these changes provide the basis for designing a more effective intervention in the future.

Paper 3

The relation between the inverse principle and arithmetic: a causal connection

Que Zheng *Department of Education, University of Oxford* **Deborah Evans** *University of Oxford*

Objectives: This study investigated whether there is a causal connection between understanding the inverse relation between addition and subtraction and arithmetic performance.

Design: This is a randomised controlled experiment. The experimental group received training on the inverse relation between addition and subtraction and the control group received the same amount of training on non-verbal spatial reasoning.

Methods: Year 3 pupils (N=103) in four British schools took a pre-test, which assessed their understanding of inversion and performance on arithmetic computations. Participants (N=42) whose scores were in the lower two-thirds in their classes were selected and randomly allocated to the intervention or the control group. Both groups received three half-hours of

training on subsequent days, followed by an immediate post-test. During the training, the children solved problems that would be more easily solved using the inverse relation (e.g. $18 + 23 - 23 = ?$; $25 + 40 - 39 = ?$); some were timed, which motivated the children to use the inverse relation to think faster.

Results: In ANCOVAs that controlled for pre-test performance, significant positive effects of the intervention were found in pupils' performance in inversion problems ($F(1,39) = 6.03$, $p = .019$; $d = 0.61$) and also in arithmetic problems ($F(1,39) = 5.87$, $p = .02$; $d = 0.48$).

Conclusions: The effects of the inversion intervention on children's arithmetic skills provide evidence for a causal connection between understanding inversion and arithmetic skills. This suggests that teaching children about the inverse relation between addition and subtraction should be part of the Years 1 and 2 numeracy curriculum.

Paper 4

The importance of reasoning in children's mathematical development: Results from an RCT

Terezinha Nunes *Department of Education, University of Oxford* **Peter Bryant** *Department of Education, University of Oxford* **Rossana Barros** *Department of Education, University of Oxford* **Debora Evans** *Department of Education, University of Oxford* **Susan Baker** *Department of Education, University of Oxford* **Philea Chim** *Department of Education, University of Oxford*

Objectives: This study's aim was to test whether quantitative reasoning plays a causal role in mathematics learning in primary school.

Design: A randomised controlled trial (RCT) with pre- and post-test was used to analyse the effectiveness of an intervention designed to improve children's reasoning about quantities and number. Randomisation was at school level to diminish contamination risk. Testers blind to the schools' condition implemented the post-test, chosen by an independent evaluator.

Methods: Year 2 children (517 in the intervention and 848 in the control group) were pre- and post-tested on parallel forms of Progress in Maths, a standardised whole class test. Teachers from intervention schools participated in a professional development programme to learn about the theory, aims and implementation of the teaching activities, which covered reasoning about quantities and about number. Activities were highly scripted, and included computer presentations for whole class teaching, small group work solving problems and playing mathematical games, and computer games for independent practice.

Results: A multilevel model found a significant difference between groups at post-test, controlling for pre-test performance. The effect size showed that the pupils in the intervention group were three months ahead of the control group in mathematical ability at post-test.

Conclusions: The strength of RCT designs with independent evaluation and teaching delivered by teachers rather than researchers provides strong support for a causal role of reasoning in mathematics learning in school. Theories which do not include reasoning in the causes of mathematical development will have to be reappraised because of these results.

Poster

Children's intergroup friendships within post-accord Northern Ireland: The role of perceived sectarian conflict

Dean O'Driscoll *Queen's University Belfast* **Laura Taylor** *Queen's University Belfast*
Jocelyn Dautel *Queen's University Belfast*

Objectives: Using a developmental intergroup framework, the study explored the impact of perceptions of intergroup conflict on children's quantity of outgroup friendships and outgroup attitudes.

Design: In accordance with contact theory (Allport, 1954), intergroup friendships may satisfy facilitating conditions for positive contact and can be effective in reducing prejudice in children (Aboud et al., 2003). However in conflict settings, perceptions of hostilities occurring between groups may limit opportunities to develop intergroup friendships. Post-accord Northern Ireland currently experiences a brittle peace as sectarian tensions continue to simmer between the Catholic and Protestant communities; often manifesting as sporadic acts of political violence.

Methods: Children aged 6-11 years old ($M=8.38$, $SD=1.26$) were recruited from primary schools in Belfast ($N=134$; 56% female; 31.3% Catholic, 68.7% Protestant). Established scales measured children's perceptions of intergroup conflict, quantity of outgroup friendships and outgroup attitudes.

Results: Perceptions of conflict significantly predicted outgroup attitudes ($\beta = -.238$, $p = .014$). Bootstrapped mediation analysis conducted in SPSS using PROCESS, then revealed that when controlling for age, gender and community background, children's quantity of outgroup friendships significantly mediated the relationship between conflict perception and outgroup attitudes (95% CI = $[-.3572, -.0335]$).

Conclusions: Children that perceived a high degree of conflict occurring between the two communities were likely to have fewer outgroup friendships and hold more negative outgroup attitudes. The findings have implications for intergroup relations within post-accord Northern Ireland and highlight the need for the provision of peace education through school-based interventions to dismantle children's perceptions of traditional conflict dynamics, and promote positive outgroup contact.

Paper

Organisation and development of cool and hot executive function in early childhood

Sarah O'Toole *University of Greenwich* **Claire Monks** *University of Greenwich* **Stella Tsermentseli** *University of Greenwich*

Objectives: In comparison to the extensive literature on cool cognitive executive function (EF), current understanding of the organisation and development of hot affective EF abilities is limited. In particular little is known about the organisation and development of hot EF in early childhood, an important period in EF development. This study aimed to explore the development of cool and hot EF skills across early childhood.

Design: A longitudinal study of two cohorts of children (4.5- and 5.5-year-olds) was carried out. Children were assessed at three time points across the course of one year: initial recruitment and six and 12 months later.

Methods: Children (N = 80) completed several performance-based assessments of cool EF (inhibition and working memory), hot EF (affective decision making and delay of gratification) and verbal ability at each time point.

Results: Cool EF showed significant age-related improvements over early childhood, but age related gains in hot EF were not found. Exploratory factor analysis indicated that the underlying structure of EF changed across early childhood. Inhibition, working memory and delay of gratification formed a distinct factor separate to affective decision making at 4.5-5.5 and 5-6 years-old. However, at 5.5-6.5 years-old affective decision making and working memory loaded on to the same factor.

Conclusions: The present study therefore did not support cool and hot EF as distinct factors during early childhood. Further, the current findings indicated that affective decision making may be a separate skill to EF.

Poster

Caregivers' references to thoughts fosters children's understanding of second-order false belief in middle childhood

Amy Paine *Cardiff University* **Salim Hashmi** *Cardiff University* **Holly Pearce** *Cardiff University* **Stephanie van Goozen** *Cardiff University* **Dale Hay** *Cardiff University*

Objectives: Caregivers' references to internal states are positively associated with children's understanding of minds (LaBounty et al., 2008; Ruffman et al., 2002). There is little research exploring this association beyond the fifth year of life, but mothers' use of cognitive verbs ("think", "know", "remember") are associated with children's performance on measures of children's advanced insights about the mind (Adrian et al., 2007; Ensor et al., 2014). Our aim was to determine if caregivers' internal state language positively influences children's theory of mind (ToM) in middle childhood using a second-order false belief (FB) task.

Design: Families were assessed (n=286) in the sixth wave of a prospective longitudinal study of a representative community sample of firstborn children and their families (mean age 83.20 months).

Methods: Second-order FB was assessed in the home using a narrative enacted with Playmobil figures. Caregivers' internal state language was coded during a caregiver-child interaction task. Language was coded for references to perception, physiology, preferences, intentions, desires, emotions and cognitions.

Results: When controlling for relevant correlates, references to cognitive terms predicted children's second-order FB understanding $\chi^2(6)=33.84, p<.001$, Nagelkerke $R^2=.22$, Wald statistic 9.61, $p<.01$, OR 1.86, 95% CI(1.26-2.76). References to "think" in particular was associated with children's second-order FB performance ($r=.22, p<.001$).

Conclusions: The present study confirms that caregivers' speech about internal states continues to foster the development of ToM in middle childhood, and corroborates previous

research that caregivers' references to cognition promotes children's higher-order FB understanding.

Paper

Stress and Coping in Parents of children with Williams syndrome: a cross-syndrome comparison

Olympia Palikara *University of Roehampton* **Maria Ashworth** *Kingston University London* **Jo Van Herwegen** *Kingston University London*

Objectives: The current study investigated stress and coping methods of parents with Williams Syndrome (WS) children and other neurodevelopmental disorders.

Design: A mixed participant design was used.

Methods: Sixty-five parents of WS children aged between five and 25 years old completed three Likert scale questionnaires embedded in a larger survey about WS needs: the Genetic Syndrome Stressors Scale (Griffith et al., 2011), the Brief COPE scale (Carver, 1997) and the Satisfaction With Life Scale (Diener, Emmons, Larsen & Griffin, 1985). Correlation analyses were used to explore the relationship between coping strategies, life satisfaction, and stress.

Results: Results demonstrated that stress levels did not correlate with children's age or parental educational level. There was a significant negative correlation between parents engaging with negative coping methods such as Self-Distraction, Behavioural Disengagement, Denial and Self-Blame, and life satisfaction and these coping mechanisms correlated with higher stress levels. In contrast, parents who looked for emotional support and engaged with religion had higher life satisfaction as well as lower stress. Interestingly, parents who used venting and planning as coping strategies had higher stress levels. These results will be compared to data from ASD and DS parents.

Conclusions: Parents of children with neurodevelopmental disorders experience higher levels of stress and lower life satisfaction. However, the type of coping strategies parents engage influence stress levels and life satisfaction. A better understanding of these coping strategies will allow the development of interventions and improve the support provided to families of children with neurodevelopmental disorders.

Paper

Adulthood Roles and Social Clock: Links to Well-Being and Need Satisfaction in Turkish Population

Nilay Pekel-Uludağlı *Ankara* **Gülcin Akbas** *Ankara*

Objectives: In today's modern world, both males and females want to establish and promote a career as well as to get married and have children. Research revealed that individuals make social comparisons to determine their social positions and if they perceive a relative inadequacy, their well-being is negatively affected. In this scope, the aim of this study was to examine how adulthood roles (marriage and parenthood) and perceived timing on these

roles (early-time, on-time, off-time) related to well-being (depression and life satisfaction) and need satisfaction (autonomy, competence, and relatedness) of young adults.

Design: This study has a correlational design.

Methods: The sample consisted of 433 female and 244 male (N = 685) participants between the ages of 24 and 41 years.

Results: Results revealed that individuals who perceived themselves as on-time for marriage reported higher levels of well-being and need satisfaction compared with individuals who perceived themselves as early or late. In addition, individuals who perceived themselves as having children on-time reported lower levels of depression and higher levels of need satisfaction compared with individuals who perceived themselves as early. In addition, for women, employment was positively associated with competence and negatively associated with relatedness. Moreover, for women, marriage was negatively associated with autonomy, and parenthood was negatively associated with life satisfaction. For male participants, marriage was positively associated with life satisfaction, while parenthood was not associated with men's well-being and life satisfaction.

Conclusions: The results suggest that fulfilling adulthood roles and the perceived timing of these roles affects well-being and need satisfaction.

Poster

Mathematical Achievement: The Effect of the Approximate Number System, Executive Functioning and Socioeconomic Status

Rosemary Penford *University of Cambridge* **Michelle Ellefson** *University of Cambridge*

Objectives: This study considered the relative impact of cognitive and social factors previously shown to impact mathematical outcomes and investigated whether cognitive abilities mediate the relationship between socioeconomic status (SES) and mathematical achievement.

Design: Utilising a between subjects, cross-sectional design, the association between three executive functions, two measures of approximate number system acuity (ANS), SES and mathematics ability in middle childhood was investigated. This design enabled an investigation of the ability of EF and ANS to mediate the link between SES and mathematical outcomes.

Methods: 110 children aged between 10- and 14- years, completed measures of inhibition (INH), cognitive flexibility (CF), working memory (WM), non-symbolic magnitude comparison, mathematical attainment and SES in a one hour session. Data were analysed via a series of regressions and a path analysis.

Results: Entering all variables into a regression resulted in SES, CF and NS significantly predicting mathematical ability. When these variables were entered simultaneously, the resultant model was significant and each variable made a significant contribution to the model. The results were suggestive of a mediating effect of CF on the ability of ANS to

predict arithmetic ability. The path analysis indicated a direct and indirect link between SES and mathematical ability, the latter mediated by CF.

Conclusions: Understanding the underpinnings of mathematical ability is complex and includes social and cognitive factors (general and specific). This study provides evidence of a mediating role for CF on social and specific cognitive abilities shown to predict mathematical outcomes in middle childhood.

Poster

Shifting attention between tasks and modalities in preschoolers and adults

Anna Peng *Birkbeck, University of London* **Natasha Kirkham** *Birkbeck, University of London* **Dennis Mareschal** *Birkbeck, University of London*

Objectives: The study aims to explore how preschooler's flexibility in attention shift differs from adult's.

Design: Switching task produces processing costs (e.g. Roger & Monsell, 1995). Duncan et al. (1997) showed that within-modal dual-task interference was greater than cross-modal dual-task interference, prompting the suggestion that task-switching costs may potentially be reduced when both task and modality change (e.g. Murray et al, 2009). However, preschoolers do not have a mature multisensory system and cognitive control. Cross-modal attention shift requires disengagement of the previously relevant sensory channel, which could be challenging for young children. If so, the relative benefits of cross-modal task-switching, as compared with within-modal task-switching, might be modulated by development.

Method: Four-, six-year-olds and adults participated in our cross-modal task-switching study (N=59). The computerised experiment involved cross-modal detection of two different target categories (animal vs. music). The participants were shown a task cue and a concurrent stimulus, and both were randomly selected. All stimuli contained either unimodal visual or unimodal auditory information. The experimental design allowed the investigation of task-switching and modality-shift effects, as well as the interactive effect on accuracy and RTs.

Result: Modality-shift incurred RT costs, while task-switching produced both RT and accuracy costs ($p < .050$). Although preschoolers were slower and less accurate, costs in task-switching and modality-shift were similar across all ages. Furthermore, the accuracy task-switching costs were only evident when the modality repeated ($p < .050$), but not when the modality shifted ($p > .700$).

Conclusion: Despite the age differences, preschoolers and adults exhibited remarkably similar attention shift costs, in terms of both task-switching and modality-shift.

Poster

Investigating the relationship between social-autistic traits, social anxiety and social insight using a novel experimental task.

Hannah Pickard *King's College London* **Francesca Happé** *King's College London*

Objectives Social Anxiety (SA) is elevated in Autism Spectrum Disorder (ASD), a neurodevelopmental condition characterised by social and communication (SC) difficulties. Despite the high prevalence of SA in ASD, research exploring the cognitive mechanisms underpinning SA in this population is limited. Recent research has proposed that individuals with ASD who show an enhanced awareness of their own SC difficulties, termed social insight, may be at an increased risk of developing SA. To date, no research has explored the relationship between social insight and social anxiety at either a clinical or subclinical level. This is primarily due to the lack of robust experimental measures of social insight, compared to theory of mind or emotion regulation measures.

Design In the present study, we have developed a novel dynamic video-based experimental task to measure social insight. Using this novel task, we aim to explore the relationship between social insight, social anxiety and social-autistic traits in a healthy adult population.

Methods The present study employs a mixed experimental design using both cognitive tasks (IQ, social insight) and questionnaires (SA, autistic traits, depression, anxiety). A sample of typically developing healthy adults (N~60) completed both accuracy and metacognitive measures.

Results Correlational analyses, multiple linear regressions and Receiver Operating Curve (ROC) analyses will be reported.

Conclusions The present research may have important implications for understanding the cognitive mechanisms associated with SA and inform the adaptation of interventions used to treat SA symptoms in individuals with ASD, who often experience increased insight into their own SC difficulties.

Paper

Egocentrism and cyberbullying: Imaginary audience and personal fable ideation predict cyberbullying and cyber victimisation in adolescents and emerging adults.

Roshan Rai *De Montfort University* **Emily Smith** *De Montfort University* **Nadia Svirydzienka** *De Montfort University*

Objectives: The imaginary audience and personal fable, or the egocentric beliefs in being the centre-of-attention and special respectively, are prominent in adolescence and emerging adulthood. The main focus of this research is to determine whether egocentric beliefs are associated with engaging in cyberbullying behaviour or being a victim of cyberbullying. Furthermore, the research also aimed to determine whether cyberbullying and victim behaviour differed according to age.

Design: The study employed a cross-sectional questionnaire-based design, investigating whether cyberbullying behaviour or perceived cyber victimisation could be predicted from the imaginary audience, personal fable, and age.

Methods: Fifty-two 14-15 year olds (attending school) and fifty 18-25 year olds (attending University) completed questionnaires measuring cyberbullying and cyber victim behaviour, the personal fable, the imaginary audience, and basic demographic information.

Results: Multiple regression analysis showed that imaginary audience ($\beta=.355$, $t(101)=3.97$, $p<.001$), and age ($\beta=.249$, $t(101)=2.80$, $p=.006$) positively predicted cyberbullying behaviour. Cyber victim behaviour was positively predicted by the imaginary audience ($\beta=.369$, $t(101)=3.98$, $p<.001$) and negatively predicted by the personal fable ($\beta=-.238$, $t(101)=-2.57$, $p=.012$). Independent samples t-tests confirmed that emerging adults cyberbullied more than adolescents ($t(100)= -2.32$, $p=.022$; emerging adult mean = 6.58, adolescent mean = 4.50).

Conclusions: Those higher in imaginary audience reported higher levels of both cyber victim and cyberbullying behaviour, whilst those higher in personal fable reported being a victim of cyberbullying less. Perhaps surprisingly, emerging adults cyber bullied more than adolescents. Aspects of developmental change, specifically egocentric ideation, could have importance to cyberbullying perpetration and victimisation.

Paper

Individual level predictors of victimisation and bullying in children with and without Special Educational Needs and Disability (SEND)

Nicola Ralph *Keele University* **Claire Fox** *Keele University*

Objectives: Children with SEND have been found to be both victims and bullies more frequently compared to non-SEND children, particularly if they have high emotional symptoms and/or few reciprocal friendships. As part of a larger study, these individual level variables were measured to investigate the risk they present for victimisation and bullying behaviours and how they interact with school level factors.

Design: A quantitative design was used to allow for a large sample size.

Method: 1,599 students (11-14 years) from nine secondary schools completed a questionnaire measuring their emotional symptoms, attitudes towards disability, reciprocal friendships, and levels of peer victimisation and bullying behaviours. Students were also asked about their disability diagnosis.

Results: Regressions were used with 6 variables (gender, year group, disability status, attitudes to disability, emotional symptoms, and number of friends) predicting victimisation and bullying behaviour. This model explained 23% of the variance in victimisation ($F(6, 1229) = 62.20, p < .001$) and 15% of the variance in bullying ($F(6, 1229) = 34.86, p < .001$). Year group, disability and emotional symptoms all significantly predicted victimisation. Gender, year group, disability, number of friends, and attitudes to disability all significantly predicted bullying.

Conclusion: These individual level factors go part way towards explaining peer victimisation and bullying experiences. However, other 'higher level' factors must also be considered when trying to explain why some children with SEND are more at risk than others with the same diagnosis.

Paper

The human fetus preferentially engages with face-like visual stimuli

Vincent Reid *Lancaster University* **Kirsty Dunn** *Lancaster University* **Robert Young** *Lancaster University* **Johnson Amu** *Blackpool NHS Trust* **Tim Donovan** *Cumbria University* **Nadja Reissland** *Durham University*

Objectives: In the third trimester of pregnancy the human fetus has the capacity to process perceptual information. With current advances in 4D ultrasound technology, detailed assessment of fetal behavior⁴ is now possible. Furthermore, modelling of intrauterine conditions has indicated a substantially greater luminance within the uterus than previously thought. Consequently, light conveying perceptual content could be projected through the uterine wall, dependent on how light interfaces with maternal tissue. We do know that human infants at birth show a preference to engage with a top-heavy, face-like stimulus when

contrasted with all other forms of stimuli. However, the viability of performing such an experiment based on visual stimuli projected through the uterine wall with fetal participants is not currently known.

Design: Behavioral responses to stimuli were assessed in 39 fetuses by an ultrasonographer and an experimenter, utilising 4d ultrasound.

Methods: We examined fetal head turns to visually presented upright and inverted face-like stimuli.

Results: A Wilcoxon Signed-Ranks test indicated that more head turns were directed towards than away from the upright stimuli ($Z = 3.117$, $p = 0.002$). More head turns were directed towards the upright than the inverted stimuli ($Z = 2.380$, $p = 0.017$).

Conclusion: The fetus in the third trimester of pregnancy is more likely to engage with top-heavy configural stimuli when contrasted to bottom heavy visual stimuli, in a manner similar to results with newborn participants. Experimental results suggest that postnatal experience is not required for this preference. In addition, this study describes a new method of delivering specific visual stimuli to the fetus. This new technique provides an important new pathway for the assessment of prenatal visual perceptual capacities.

Paper

Attentional Bias towards Threat: A Comparison of Fear and Disgust Vicarious Learning

Gemma Reynolds *Middlesex University* **Chris Askew** *Surrey University*

Objectives: Whilst anxiety disorders have traditionally been argued to emerge from a dysregulation of fear, research has recently argued that disgust may also be involved in their etiology. This research aimed to compare the influences of disgust and fear vicarious learning (learning through observation) on the acquisition of fear and disgust responses in children aged 7-10.

Design: The research implemented an established prospective vicarious learning paradigm used to explore fear vicarious learning in previous studies. In a between-subjects design, children were randomly assigned to one of two groups: Fear or Disgust.

Method: Children in the Fear group ($N=27$) were presented with pictures of novel animals alongside faces expressing fear. Children in the Disgust group ($N=26$) received the same paradigm but the animals were presented alongside faces expressing disgust. Children's cognitive, behavioural and attentional responses were measured pre- and post-learning.

Results: Compared to a control animal, both fear and disgust vicarious learning led to increases in fear cognitions, disgust cognitions, and avoidance preferences, and also elicited an attentional bias towards the threatening animal, with similar reaction times and accuracy regardless of threat-type. Self-reported disgust propensity and disgust sensitivity had no influence on any vicariously responses.

Conclusions: This is the first demonstration that both fear and disgust vicarious learning can elicit attentional bias in children. Given that attentional bias towards threat is thought to function as an early detection system for potential danger, the current findings suggest that disgust is as much a defensive emotion as is fear, and that the association between disgust

and a particular stimulus can be acquired vicariously in the same way an association between fear and a stimulus can be established.

Poster

When older might not be wiser. The development of creativity in primary school children

Cathy Rogers *Birkbeck, University of London* **Jessica Massonnié** *Birkbeck, University of London* **Michael Thomas** *Birkbeck, University of London* **Andrew Tolmie** *UCL Institute of Education*

Objectives: Previous research has shown that creative skills do not always increase monotonically across development. The aim of this study was to assess whether children's creative development follows different trajectories in verbal and figural domains, and to compare children's creative development with that of other dimensions of cognition.

Design: A cross-sectional design was used to analyse data from children aged 5 to 11 years. Participants were tested on the Torrance Tests of Creative Thinking: three subtests of figural creativity and one of divergent thinking. Children also completed Guilford's Alternative Uses Test (AUT).

Methods: 28 participants (mean age 7.5 years, range 4.95 to 11.36) were tested in half hour sessions. Their verbal responses were scored for fluency (number of ideas), flexibility (categories) and originality, and their drawings for fluency, originality, elaboration (detail), abstractness of titles, resistance to closure and overall creative strength. The children's executive functions and IQ were also assessed.

Results: Linear regression analyses found that none of the figural creativity measures improved significantly with age. The pattern with verbal creativity was more mixed, with some measures showing age related improvements, and others not. As expected, IQ scores and most EF measures improved with age.

Conclusion: Higher cognitive abilities generally show robust developmental increases. Patterns of creative development were modulated by verbal vs. figural domains, but neither showed monotonic developmental increases. In contrast, developmental increases in knowledge were observed. Future work will seek to strengthen these findings with a larger sample and extend consideration to measures of convergent creative thinking.

Paper

“Friends are hard...but it gets better”: an examination of the friendship experiences of adolescent girls and adult women with autism

Felicity Sedgewick *CRAE, UCL Institute of Education* **Vivian Hill** *UCL Institute of Education* **Elizabeth Pellicano** *CRAE, UCL Institute of Education*

Objectives: This research sought to examine the friendship experiences of autistic girls and women, to elucidate similarities and differences across distinct stages of development.

Design: This qualitative study was designed to examine the social experiences of autistic girls and women. Semi-structured interviews were used to allow for individual responses alongside specific questions.

Methods: 27 autistic girls and 15 autistic women took part. Interviews focussed on friendships and relationship difficulties. Thematic analysis was used.

Results: Autistic girls and women shared many themes in their interviews, with specific features developing across the lifespan. Friendships – both groups talked about having small numbers of close friends. In adulthood, romantic partners often became the most important relationship. Conflict – all participants talked about being involved in relational conflict, which they found difficult to understand. Adults and adolescents had similar conflict resolution strategies – either taking the blame, or ending the relationship. Camouflaging – both groups said that “friends are people you can be yourself with”, in contrast to needing to manage how they appeared to others. Vulnerability – every adult described how difficulties reading social situations had left them vulnerable, particularly sexually. While this did not feature for girls, it is an area where women need support.

Conclusions: The friendship and conflict experiences of autistic girls are maintained into adulthood. Some aspects develop over time, particularly in terms of romantic encounters. While misunderstandings in these cases can leave autistic women vulnerable, there is also a message of hope in that social satisfaction seems to increase with age and self-assurance.

Poster

Child- and school-level predictors of children’s bullying behaviour: A multilevel analysis in 648 primary schools

Helen Sharpe *University of Edinburgh* **Elian Fink** *University of Cambridge* **Praveetha Patalay** *University of Liverpool* **Miranda Wolpert** *University College London*

Objectives: This study aimed to examine the independent and combined influence of child- and school-level predictors on bullying behaviour in primary school.

Design: We used data from a large cross-sectional survey in England.

Methods: The study involved 23,215 children (51% boys) recruited from year 4 or year 5 ($M = 9.06$ years, $SD = .56$ years) from 648 primary schools. Children provided self-report on bullying behaviour and school climate. Demographic characteristics of children (gender, deprivation, ethnicity, special educational needs, first language) were obtained from the National Pupil Database, and demographic characteristics of schools (school size, gender, deprivation) were drawn from EduBase.

Results: Multi-level logistic regression models showed that a child’s gender, ethnicity, deprivation and special educational needs status all predicted bullying behaviour. Of the school-level predictors, only overall school deprivation and school climate were predictive of bullying behaviour once child-level predictors were taken into account. There was a significant interaction between child- and school-level deprivation; being in a high-deprivation school was a risk factor for bullying only for children that came from non-deprived

backgrounds, whereas deprived children reported engaging in bullying behaviour irrespective of school-level deprivation.

Conclusions: Given the independent and combined role of child- and school-level factors for bullying behaviour, the current study has implications for targeted school interventions to tackle bullying behaviour, both in terms of identifying high-risk children and identifying high-risk schools.

Symposia

Furthering our understanding of growth mindsets

Yvonne Skipper *Keele University*

There is currently a great deal of interest in Dweck's (2000) concept of theory of intelligence. She states that learners can hold either a growth mindset, believing that intelligence can grow and change, or a fixed mindset, believing that intelligence is a fixed trait. A number of studies have shown that a growth mindset leads to positive outcomes, such as improved performance and persistence following failure.

However, there are still a number of unanswered questions, for example we do not fully understand mindsets in young children. In addition, we do not understand how mindsets interact with learning difficulties and also whether growth mindsets may sometimes lead to negative outcomes. This symposium will help answer these questions.

The first presentation reports on the development of a measure of mindset in much younger children than the traditional measure, which was developed for children of 10 and older. The second presentation reports a co-created intervention which has been delivered by teachers and aims to promote more of a growth mindset in 5 year old children. The third presentation explores how a growth mindset may be associated with positive coping with dyscalculia. The final presentation suggests that a growth mindset may not have uniformly positive outcomes, as young people who held more of a growth mindset were also more likely to overwork.

This symposium will therefore further our understanding of this theory so that we can better understand how to put it into practice to lead to positive outcomes in classrooms.

Paper 1

Measuring growth mindsets in young children

Yvonne Skipper *Keele University* **Nicholas Garnett** *Keele University*

Background: The concept of mindset has been widely researched by Dweck and colleagues (Dweck, 2000). However, most measures which exist have been developed to explore mindsets in children aged 10 or older.

Aim: The aim of the current study was to use information from focus groups to develop a short questionnaire measure of mindset for young children.

Method: Participants were (N=60) 5-6 year old children who participated in one of 10 focus groups answering questions about intelligence. Children participated in a 30 minute focus group where they were asked questions about what makes people clever? We also developed a 10 item measure of mindset in children. This measured mindset directly and also indirectly via learning goals and responses to failure. Our measures were then given to 89 adults who also completed Dweck's traditional questionnaire Dweck (1999) to examine whether our measures were tapping into similar constructs.

Results: Results suggested that even young children demonstrated some behaviours associated with mindsets. Furthermore, our measure and the traditional Dweck (1999) measure were positively correlated $r(86) = .635, p < .001$. However, children's responses to our measures were not as consistent as may have been expected, suggesting that perhaps children's understanding of mindsets is not as developed as those of adults.

Conclusion: Even children as young as 5 appear to have a mindset and this can be measured using a simple questionnaire. However, their mindsets may not be as fully formed as that of an adult.

Paper 2

I think I can, I think I can: Growth Mindsets and Year 1 Pupils' Literacy

Nick Garnett *Keele University* **Yvonne Skipper** *Keele University*

Objectives: Most interventions which utilise Dweck's mindset framework target pupils over 10 years of age, and are usually designed and delivered by researchers. However, this project developed a co-created 'light touch' intervention, promoting growth mindsets, which was delivered by teachers to Year 1 pupils. We measured the impact of our intervention on mindsets in both children and teachers. We also explored how changes in mindset would impact children's literacy development.

Design: A quasi-experimental design was used.

Methods: Schools (N=9) were recruited with (N=21) teachers and (N=505) pupils. The intervention was co-created with teachers and consisted of a short booklet, designed to be 'stand-alone'. Teachers were given no other instruction regarding the intervention. Baseline data was collected during June 2016: pupils completed the Phonics and Early Reading Assessment (Hodder Education, 2012) and a mindset measure developed for use with

younger children. Teachers completed instruments investigating their personal mindset, their views of their pupils and the culture within their classroom and school.

Results: Multi-level modelling of pre-test data suggests there is a positive relationship between mindset and literacy scores, and that teachers' mindsets also influence pupil level data. Post-test data will be collected in June 2017.

Conclusions: Co-creation enabled the creation of a 'teacher friendly' intervention which is more likely to be utilised by teachers, adding to its efficacy. A culture of growth mindset in a classroom can help pupils overcome the challenges which are part of early literacy development.

Paper 3

Mind set and positive outlooks: Inoculating influences that mediate the psychological effects of growing up with difficulties in mathematics

Eleanor Willard *Leeds Beckett University*

Objectives: This research is part of a three year project examining Dyscalculia in adolescence. The research is focused on the issues with number sense processing that some people experience.

Design/Methods: Phase Two of the research, which followed administration of a Dyscalculia screener in Phase One to 375 students, looked at the perspectives of those who have such difficulties and those who are not affected in the same way with perception of mathematical information. Q methodology was used to examine the outlooks of 34 children aged between 11 and 15 with two key aims. Firstly, to ascertain what the feelings and attitudes of adolescents with number sense difficulties are, and secondly to compare the feelings and attitudes of the students who struggle in this respect to those expressed by students who do not have such difficulties.

Results: Following analysis of the results there were 7 factors (outlooks) expressed within the group. These were given the names; helpless, persistent, optimistic, future focused, competent, anxious and baffled. These were then compared and both similarities and differences considered. The overarching factors to emerge, that seemed to mediate the psychological effects, were a growth mind set, together with perception of ability within the class, optimism, resilience and the perceived importance of mathematics to everyday life.

Conclusion: The implications of these findings for feedback given will be discussed in the presentation.

Paper 4

Might a growth mindset be linked to overworking in the context of low academic confidence?

Emma Dunmore *Leeds Beckett University* **Rajmul Reynolds** *Leeds Beckett University*

Objectives: Dweck's influential work argues that those with a growth mindset hold an incremental view of intelligence. Although there are many ways to "grow intelligence" the emphasis tends to be placed on effort. This raises the question of whether this emphasis on effort might lead to overworking. It is hypothesised that overworking might be particularly likely if a person with a growth mindset lacks academic confidence.

Design/Methods: The aim of this preliminary study was to investigate the possible interaction between a growth mindset and low academic confidence in overworking. 133 undergraduates completed a series of online questionnaires assessing mindsets, academic confidence and elements of perfectionism. Overworking was assessed using a specifically designed questionnaire including items such as "I sacrifice taking part in other activities due to work".

Results: A two-way ANOVA was conducted with groups with fixed / growth mindsets and low / high academic confidence. There was a significant main effect of mindset ($p \leq .001$) with people with a growth mindset scoring significantly higher on overworking compared to those with a fixed mindset. There was no significant main effect for academic confidence, but a significant interaction was found ($p = .016$) with individuals with a growth mindset and low academic confidence having the highest overworking scores.

Conclusion: Whilst the evidence of the beneficial effects of growth mindsets on achievement is compelling (Yeager et al., 2016), this study provides an indication of possible negative effects of growth mindsets in terms of overworking. However, the results require replication with a validated measure of overworking.

Paper

Viewing Social and Non-Social Information of Naturalistic Scenes in High-Functioning Adults with ASD

Simona Skripkauskaitė *Univeristy of Roehampton* **Jennifer Mayer** *Univeristy of Roehampton* **Aleksandar Aksentijevic** *Univeristy of Roehampton* **Lance Slade** *Canterbury Christ Church University*

Objectives: The current study aimed to directly compare attention to social and non-social information in naturalistic scenes within and between adults with and without ASD. It further investigated whether the content of the scene and the nature of the competing non-social information moderated the reduced attention to socially relevant information (i.e. people) seen in individuals with ASD.

Design: An experimental within participant design in combination with eye tracking technology was employed to investigate gaze duration to social and non-social parts of naturalistic scenes. Social and non-social areas of scenes differed in their perceived priority and scenes overall differed in their "busyness" and whether they were presented with no, low or high intelligibility background noise.

Methods: The sample consisted of 24 high-functioning adults with ASD and 26 mean age and IQ matched TD adults. Their gaze duration data was analysed using linear mixed-effect (multilevel) modelling.

Results: Participants with ASD viewed social and perceived priority areas of the scenes less than TD adults. However, scene "busyness" affected adults with and without ASD similarly

by reducing their attention to the scene overall, to the priority information, and to the social information, in particular.

Conclusions: The findings suggest that the reduced social attention in ASD occurs due to the lack of social bias, seen in TD adults, rather than to non-social bias. Findings that adults with ASD pay less attention to the information prioritised by TD adults are discussed in terms of 'gestalt' notions of perception.

Paper

The reading development of children learning English as an additional language

Natalie Smith *University of York*

Objectives: While much is known about the reading development of monolingual English-speaking children (EL1), the pattern of reading development for children learning English as an additional language (EAL) in the UK remains unclear. In light of this, the reading-related skills of EAL and EL1 children were explored within two year groups; Year 2 and Year 4.

Design: The cross-sectional data provided detailed comparisons of the skills that underpin reading comprehension for EAL and EL1 children.

Methods: Children completed an individually administered battery of tests. This included measures of oral language, word reading, working memory, non-verbal ability and reading comprehension. In total data were collected from 49 Year 2 children (26 EAL) and 61 Year 4 children (34 EAL). MANOVAs were carried out to examine group differences.

Results: EAL children had lower levels of oral language, reading comprehension and non-verbal ability in comparison to their EL1 peers in both Y2 and Y4. Measures of word reading were, however, comparable among the two language groups. When controlling for the unexpected difference in non-verbal ability, the differences in reading comprehension and oral language only emerged in Y4. Interestingly, the gap between the EAL and EL1 children on measures of reading comprehension and oral language was greater for the Y4 children than the Y2 children.

Conclusions: Further longitudinal studies will be carried out to understand the developmental trajectory of the reading-related skills for this population of children. However, the cross-sectional findings imply that EAL children need further support with their oral language skills.

Paper

Overweight prejudices and its role in people's trust in sources of knowledge with different body type

Irene Solbes Canales *Universidad Complutense de Madrid* **Garijo Sonia** *Universidad Complutense de Madrid* **Ileana Enesco** *Universidad Complutense de Madrid*

Objectives: Previous works have shown how children show a selective trust in the information provided by other people depending on their epistemic characteristics. However,

there are still very few studies examining the influence of non-epistemic characteristics of the informants. The aim of our research was to deepen in the study of the influence of body size in trustworthiness that children consent to their testimony, focusing on the relationship between the former and the children's stereotypes and identification processes.

Design: An interview was individually applied to the children in a quiet room.

Methods: Forty-four Spanish children aged 5 and 7 years participated in the study. Three tasks were presented to them. The first one was a labeling task, where children had to endorse new names for unknown objects proposed by two informants that differed in their body sizes (average weight versus overweight). The second task was designed to assess three different aspects of children's identification related to their body type: self-identification, ideal identification and negative identification. Finally, the third task assessed children's body type stereotypes using an adjective attribute task.

Results: Results showed selective confidence toward the group not socially stigmatized. Regarding identification and stereotype tasks, we found a positive bias toward average figures opposite to the overweight ones, and a weak relationship between these measures and the election of the informant in the labeling task.

Conclusions: Psychological and educational implications of these results are discussed, especially for overweight children who might be facing prejudices and mistrust by their peers.

Poster

The development of mind reading: An in-depth investigation of the developmental link between metacognition, mind reading and self-control.

Maríel Symeonidou *University of Dundee* **Martin Doherty** *University of East Anglia*
Josephine Ross *University of Dundee*

Objectives: Increasing evidence shows that metacognition, contrary to previous beliefs, develops before the age of 5. Recent studies have utilised child friendly measures, taking into account young children's limitations, to test different metacognitive skills. They found that children as young as 3 can introspect on uncertainty and act appropriately on it. In regards to Theory of Mind (ToM), an emerging theory is that metacognition is a prerequisite for ToM. Furthermore self-control, a necessary component of mind reading, could also be related to metacognition. The current study is part of longitudinal work exploring the developmental link between these three skills.

Design: This is part of an ongoing longitudinal study (3 phases, each 6 months apart). In each phase children are assessed on, self-control, mind reading ability and metacognitive skills.

Methods: 58 typically developing preschool aged children completed a Stroop Task (Night/Day) and a ToM battery (Sally-Anne Task, Knowledge Access etc). A certainty monitoring paradigm, presenting pairs of pictures relating to target items, was also used to assess metacognition.

Results: Phase 1 suggested that metacognition tasks are passed before self-control tasks, which are passed before ToM tasks. Phase 2 data supported the findings from Phase 1.

Conclusion: The results suggest that there is a relationship between children's ability to reflect on their own mind, and their ability to reflect on other minds. However, the relationship appears to be mediated by self-control.

Paper

Spelling predictors of English Additional Language and English-only children with and without a spelling difficulty

Aris Terzopoulos *University of Dundee & Coventry University* **G.Z. Niolaki** *Coventry University* **J. Masterson** *University College London*

Background: This study investigates spelling performance of English only and English Additional Language (EAL) children with and without spelling difficulties. Knowledge of an additional language might indicate reliance on different spelling processes. It might be expected that phonological ability would be more strongly associated with spelling performance in EAL children due to awareness of a more transparent language than English. It might also be expected that children with spelling difficulties might use different spelling skills in comparison to the two groups with no spelling difficulties.

Methods: Participants (N=217, age range from 7 to 10 years, recruited from schools in the UK), were assessed with a standardised single word spelling test (WIAT-II, Wechsler 2005). They were also assessed in phonological ability, rapid digit naming, visual attention span, visual memory and two tasks of print exposure. One-way ANOVA and correlational analyses were conducted to investigate associations and to compare performance.

Findings: We found that EAL groups performed significantly lower in print exposure tasks in comparison to English-only typical spellers ($t_{EALtypical(144)}=6.67, p<.001, r=.49$ & $t_{EALatypical(144)}=4.38, p<.001, r=.34$) but not differently to English-only atypical spellers ($p>.05$, respectively).

Discussion: These findings demonstrate the importance of appropriate interventions for bilingual children targeting if possible both languages and with selection of appropriate stimuli for spelling support. Thus, we also discuss the importance of developing psycholinguistic databases for bilingual children like BiLex-Kids, a database we developed for bilingual children learning Greek as a second language.

Paper

Investigating the development of executive functions in adolescence.

Thalia E Theodoraki *School of Philosophy, Psychology and Language Sciences, University of Edinburgh* **Sarah McGeown** *The Moray House School of Education, University of Edinburgh* **Sarah E. MacPherson** *School of Philosophy, Psychology and Language Sciences, University of Edinburgh*

Objectives: Executive functions (EFs) refer to mental control processes that direct behaviour. EF development has primarily been studied among children, despite research indicating that EFs continue to develop throughout adolescence and into adulthood. The present study investigated EF development during the later stages of adolescence.

Design: A cross sectional study was carried out, with correlation and regression analyses examining the relationship between EFs and age.

Methods: Adolescents (N=348, mean age= 15.74 years, range= 14-18 years) were individually assessed on three behavioural tasks measuring response inhibition, set shifting and information monitoring.

Results: Adolescents' age was significantly, albeit weakly, correlated with their inhibition and monitoring scores ($r=.21$ and $r=.12$ respectively, both $p < .05$), but not with their shifting score ($r=.00$, $p > .05$). Age additionally correlated with colour naming ability, $r=.24$, $p < .05$ and verbal memory capacity, $r=.18$, $p < .05$; non-executive processes measured by control conditions of the inhibition and monitoring tasks respectively. Regression analyses showed that 50% of the variance in inhibition scores and 40% of the variance in monitoring scores (both $p < .001$) was explained by a combination of variables, including adolescents' age, socioeconomic status, non-executive processes and whether they suffered from a condition.

Conclusions: Within this large sample of older adolescents, there appears to be little evidence of EF development with increasing age. It is noteworthy that the non-executive processes thought to affect performance on the EF tasks explained the most variance in the inhibition and monitoring scores, showing the importance of controlling for these processes when examining age related changes in EFs.

Paper

A new measure of play: Exploring the different components of peer pretend play

Pablo Torres *PEDAL Centre, University of Cambridge* **Silvana Mareva** *PEDAL Centre, University of Cambridge* **Elian Fink** *PEDAL Centre, University of Cambridge* **Jenny Gibson** *PEDAL Centre, University of Cambridge*

Objectives: While play is a frequent activity across childhood it has proven notoriously difficult to define and empirically explore. The current study aimed to develop a coding scheme of directly observable behaviours to enable the study of different components of peer pretend play.

Design: The current study adopted an observational paradigm so that pretend play could be observed and coded during peer dyadic interaction.

Methods: 234 five year-olds ($M_{age} = 5.10$, $SD = .40$) were videotaped for 8 minutes while playing with a friend within two counterbalanced pretend play contexts. A coding scheme was developed based on the existing play literature and after observing a pilot sample of play interactions. The final coding scheme included over 30 behavioural indicators of four play components; pretence, amity, positive affect, and play negotiation/coordination. A random subsample of over 15% of children ($n = 37$) were independently coded by two researchers to examine measurement reliability.

Results: The four key components were reliably coded (Kappas .70 to .85).

Conclusions: Play with a peer was observed to be an enjoyable activity which affords opportunities to practice a host of interpersonal developmental drivers, such as shared positive affect and perspective-taking. These clear and observable criteria for assessing the components of play will go some way to unifying the observational research on children's play, and allow future research to examine the association between children's play and other key features of social and cognitive development, such as theory-of-mind understanding, peer relationships and behavioural problems.

Poster

Can mothers' mental state words predict children's theory of mind performances?: In case of Japanese mother and child

Kaoru Toyama *Ryukoku University*

Background & purpose: It has been pointed out that the use of mothers' mental state words influences not only at that point but also the later development in theory of mind in Europe and the United States. In Japan, however, the results about relationship between these two factors have not been consistent. In addition, these associations have only been verified with false belief tasks. Therefore, this study aims to examine the relationship between mothers' mental state words usage and the development of the children's theory of mind using the theory of mind scale (Wellman & Liu, 2004). Theory of mind scale was consisted of not only false belief but also desire, knowledge, and emotion.

Methods: Fifty-three 5- to 6-year-olds children were individually tested on theory-of-mind scales. In addition, the children and their mothers participated in a make-a-story task using CAT (Children's Apperception Test) which was created so that the desires and emotions of the main characters were easily induced. The use of mothers' mental state words was classified according to the index of Bretherton & Beeghly (1982). That is, "perceptual", "physiological", "emotional and affective (positive/ negative)", "cognitive", and "volition".

Conclusions: It had significant positive correlation only between the use of mothers' "physiological" words and children's theory of mind performances ($r=.27$, $p<.05$). After controlling mothers' educational record and children's verbal ability, this correlation became lower ($r=.26$, $p<.10$). In Japan, therefore, it was suggested that it is difficult to predict the children's theory of mind performance from the use of mothers' mental state words.

Paper

The Ability to Predict Road-user Intentions in Children with ADHD: the role of Cognitive Functions

Martin Toye *The University of Edinburgh* **James Thomson** *The University of Strathclyde* **David Coghill** *The University of Melbourne* **Sinead Rhodes** *The University of Edinburgh*

Objectives: This study set out to examine differences in the relationship between cognitive functioning and the ability to predict road-user intentions in children with ADHD before and after titration to stimulant medication.

Design: 61 children with ADHD were compared with 61 typical controls on tasks assessing cognitive function and on a task assessing the ability to predict road-user intentions. 31 children in each group were retested 14 months later when the ADHD group were titrated onto stimulant medication.

Methods: Children completed tasks from the CANTAB battery assessing inhibition, spatial working memory and short-term memory as well as a task from the Crossroads pedestrian training software assessing the ability to predict road-user intentions, at both baseline and follow-up.

Results: At baseline, children with ADHD were impaired in the ability to predict road-user intention compared with controls. Ability increased with age in children with and without ADHD but typical children showed greater age-related improvement. Short-term memory predicted the ability to predict road-user intentions but children with ADHD showed short term memory impairment which appears to underpin impaired pedestrian skill-level. After medication, performance on the predicting road-user intentions task in the ADHD group was normalised and there was also no difference between children with and without ADHD on the short-term memory task.

Conclusions: Children with ADHD are less able to predict road-user intentions but medication appears to ameliorate this impairment. This may arise from corresponding improvement in short-term memory which appears to underpin performance of this road safety skill. These findings carry implications for parents of children with ADHD, educators and clinicians.

Paper

Is the false-belief task the best measure of mentalising ability?

Hiromi Tsuji *Osaka Shoin Women's University*

Background: The false-belief task is used as a common measure to assess mentalising ability. However, is it the most appropriate assessment tool? This study examined if the FB task requires greater mentalising ability than alternative measures such as picture-sequencing, which places less demand on linguistic processing. We hypothesized that children need higher levels of executive function and language to pass the FB task than alternative measures.

Method: 166 Japanese-children between 3 and 6 years old at a preschool participated in this study. The children were tested with executive function tasks: working memory, pointing-stroop and Dimensional Change Card Sort; receptive language; and mentalising tasks: FB and picture-sequencing. Path analyses were conducted to find the best model to describe the relationship between FB and picture-sequencing using AMOS.

Findings: The model that included a path drawn from picture sequencing to FB gave the best fit: $X^2(5) = 4.331$, $p = .503$, $AGFI = .959$, $RMSEA < .0001$, $AIC = 50.331$. In this model, age and receptive language Stroop but not DCCS showed a significant contribution to picture-sequencing, and explained 50% of variance. Picture-sequencing contributed significantly to

FB. In addition, DCCS and receptive language contributed independently to FB. Together, 50% of the variance was explained by these variables.

Discussion: These results suggest that cognitive control as measured by DCCS and receptive language are needed to pass FB. The present study provided empirical evidence to suggest that FB task measures more abilities than just mentalising.

Paper

Sexting: Individuals under 18 years placing themselves at risk

Ayesha Turner-Distin *University of Nottingham* **Kevin Browne** *University of Nottingham*

Sexting refers to sending an explicit images of yourself to another. This behaviour has been observed in people of all ages, however, when an individual is less than 18 years it constitutes an illegal image. Previous studies indicate that 'sexts' are sent to strangers, friends and acquaintances using the internet. The aim of this study was to assess the prevalence and characteristics of sexting in an online sample. Data was collected via the internet from 1141 individuals (aged between 16 and 64) who completed an online questionnaire after giving informed consent. Variables associated with sexting strangers were identified using logistic regression. It was found that 61.2% of the sample reported sexting others in their life time. Of the 698 people who were sexting; 45.8% of them indicated that they had started before the legal age (18 years), with the youngest being just 11 years old, and 43.0% of participants had 'sext' a stranger. Sexting to strangers was significantly more likely to be associated with individuals who were under 18 years, sexting to more than one person, sometimes or always keeping their face hidden, lower in self-esteem and sending nude images. As two fifths of respondents were sexting online strangers, there is a need for young people to receive education regarding sending explicit images through the internet and the dangers of being traumatised and sexually exploited as a consequence.

Paper

Atypical development of Approximate Number Sense abilities in Williams syndrome and Down syndrome: evidence from behavioral and eye movement data.

Jo Van Herwegen *Kingston University London* **Annette Karmiloff-Smith** *Birkbeck University of London* **Vistoria Simms** *University of Ulster*

Objectives: Previous studies have shown that the Approximate Number Sense (ANS) is impaired in Williams syndrome (WS) throughout the life span (Rouselle et al., 2013; Van Herwegen et al., 2008). However, ANS abilities in Down Syndrome (DS) appear to be in line with typically developing (TD) peers in infancy, but children and adults' ANS abilities are only comparable to non-verbal IQ age matched controls, suggesting that ANS abilities are impaired later in development (Abreu-Mendoza & Arias-Trejo, 2015). A potential explanation for this has been attention-switching difficulties in WS and, in contrast, difficulties with sustained attention in DS.

Design & Methods: The current study examined the development of ANS abilities across a wide age range in 30 participants with WS (mean age: 20 years and 6 months, SD= 12.97) and 30 with DS (mean age: 21 years and 2 months, SD= 10.69). A group of TD children and adults whose chronological age and mental age fell within the range of the WS and DS groups was recruited.

Results: Developmental trajectory analyses showed that performance on ANS task improved in line with mental age abilities in both WS and DS. In addition, there were no differences between the WS and DS groups for the onset and the slope of development with the TD children.

Conclusions: This suggests that performance on the ANS task is delayed but follows a typical pattern in WS and DS. Further evidence from eye movement data will be discussed to support this claim.

Paper

Links between Early Adolescent Social Anxiety and Depressive Symptoms: Testing the Mediational Effects of Online and Offline Victimization

Nejra Van Zalk *University of Greenwich* **Maarten Van Zalk** *University of Münster, Germany*

Social anxiety and depressive symptoms tend to co-occur in early adolescence, and interpersonal stressors such as victimization might affect this process indirectly. This paper focuses on the temporal sequence of social anxiety and depressive symptoms, and whether interpersonal stressors such as online and offline victimization might mediate these links. We used a longitudinal sample of 501 early adolescents (51.9% girls; Mage = 13.96) followed at 3 time points (with about 8 months between the time lags). To examine the links between social anxiety and depressive symptoms, we employed a cross-lagged path model in MPlus. We also tested for mediating effects of online and offline victimization on the links between social anxiety and depressive symptoms. Finally, we tested for differences between girls and boys. Our results indicate that social anxiety predicted depressive symptoms over time, but not the other way around. Time-1 social anxiety and depressive symptoms also predicted online victimization, but only for boys and not for girls. In addition, offline victimization predicted online victimization and depressive symptoms over time. No mediating effects of online and offline victimization emerged; however, Time-2 social anxiety was a significant mediator between Time-1 social anxiety and depressive symptoms. In conclusion, social anxiety was a strong predictor of depressive symptoms over time but not vice versa – irrespective of interpersonal stressors such as online and offline victimization. Understanding more about the comorbidity between social anxiety and depressive symptoms early on is crucial in order to help prevent problems in the future.

Paper

Emotions and the Development of Moral Identity

Daniel Vanello *Warwick Mind and Action Research Centre, University of Warwick*

The aim of this paper is to bridge two separate research areas in moral development to argue that the development of emotions is a constitutive developmental component of moral identity. The importance of the formation of moral identity resides in its intrinsic relation with moral motivation (see Tina Malti and Michaela Gummerum). The following argument is based on literature search.

Empirical studies suggest that the development of moral identity is the outcome of an integrative process between a child's self-understanding and moral understanding. In other words, moral identity results when the subject understands herself through moral concepts (see Augusto Blasi; William Damon and Daniel Hart on moral identity in childhood and adolescence; Anne Colby and William Damon on moral exemplarity).

At the same time, empirical studies on the formation of the self-concept and knowledge of others in typically and atypically developing children e.g. children with autism, suggests that social-affective processes, such as the ability to affectively respond to others' emotional

expressions, are a necessary component in the development of the child's understanding of others and oneself as ethical agents (see work by Peter Hobson and Vasu Reddy). These works suggest that social-affective processes entail the simultaneous acquisition of self and moral concepts.

I argue that these works show that the development of emotions, due to their relational and evaluative structure, is a constitutive developmental component of the integration of moral concepts into the child's self-understanding and thus that moral identity has an affective base.

Poster

Identifying the needs of young people in secure care: Who are children in custody?

Louise Warner *CNWL NHS Foundation Trust*

Objectives: This national service evaluation was conducted across all secure settings for English young people, to identify their pathways into secure. The aim is to promote discussion about what provision can best meet the needs and reduce risks for these children.

Design: This study comprises 3 parts:

1. **Scoping:** a contact at all secure units (UK) completed a questionnaire over the phone, about unit provisions, e.g. about healthcare interventions available.
2. **Census:** the number of young people in secure units was recorded on 14/09/16. Questionnaires gathered information on pathways & mental healthcare needs, for each young person.
3. **Qualitative interviews:** Stakeholders (clinicians, social workers, parents), were asked their views about how system works to meet young peoples' needs.

Methods: Fifty-six secure units (UK) were identified, from commissioners' lists and through snowballing techniques. Each provided a named contact, who completed a scoping questionnaire. For the census, they provided the number of young people detained there. Clinical teams completed patient questionnaires. A random sample of 40 people associated with secure units were selected from a list of people interested for qualitative interviews.

Results: There were 1299 English young people in secure institutions on 14-09-16.

We have identified:

- patterns of mental health needs across different secure units
- patterns of placement histories for these young people, detained under different legislation.

Conclusions: This, the first full service evaluation across the entire secure system for young people, informs commissioners/clinicians of the wellbeing needs for these children, to enable planning of system improvements.

Paper

How orchids and dandelions concentrate: the contrasting attentional profiles of typical 12-month-olds who show high, and low, stress reactivity.

Sam Wass *University of East London* **Kaya de Barbaro** *University of Texas Austin*
Kaili Clackson *University of Cambridge* **Vicky Leong** *University of Cambridge*

Objectives: Differential Susceptibility Theory explains long-term associations between stress and cognitive outcomes. However, little previous work has examined whether a more sensitive stress system confers performance advantages, or disadvantages, over shorter time frames..

Design: We presented a battery constituting mixed static and dynamic viewing materials to 63 typical 12-month-olds. In addition, at two moments in the battery, stress reactivity was assessed using a mild behavioral video stressor. Finally, four sessions of attention training were applied to a subset of the infants (24 trained, 24 active controls).

Methods: While viewing the battery, infants' spontaneous visual attention (looks to and away from the screen) was measured. Concurrently, arousal was recorded via heart rate, electrodermal activity, head velocity and peripheral movement levels. Before and after attention training infants' visual attention was assessed along with their natural stress fluctuations and stress reactivity.

Results: We found that infants who were generally more attentive showed smaller heart rate increases to the stressor. However, they also showed greater phasic autonomic changes to attention-getting stimulus events, a faster rate of change of both look duration and of arousal, and more general oscillatory activity in arousal. Training led to increased visual sustained attention. No changes in HR responses to stressor were observed following training, but concomitant increases in arousal lability were observed.

Conclusions: Our results point to two contrasting autonomic profiles: infants with high autonomic reactivity to stressors show short attention durations, whereas infants with lower autonomic reactivity show longer attention durations and greater arousal lability.

Paper

Exploring the Broader Autism Phenotype and Fragile X Premutation in females: autistic traits, mental health and the impact of caring for a child with a neurodevelopmental disorder

Sarah J White *University College London* **Denise Gerber** *University College London*
Romina Sanchez-Hernandez *University College London* **Jo Moss** *University of Birmingham*

Objectives: Fragile-X Syndrome (FXS) is the most common known genetic cause of autism. Relatives of autistic individuals exhibit subtle autistic traits. Mothers of children with FXS carry the FXS premutation themselves. This study aims to explore the emotional and

behavioural traits of mothers with the FXS premutation (M-FXS) and mothers of autistic children (M-ASD), and the interaction between these traits and the experience of parenting a child with a neurodevelopmental disorder (NDD).

Design: This is a between group design involving groups of mothers of children with and without NDDs, and females with no children.

Methods: An online questionnaire was completed by women under 50 years, including assessments of mental health, intelligence, parental stress and autistic traits.

Results: The M-FXS group scored similarly to the M-ASD group; both groups showed more autistic traits, more mental health symptoms and higher parenting-related stress than mothers of typically-developing children. We are currently collecting data from females with the FXS premutation but without children, to establish the genetic contribution to these traits. The M-FXS and M-ASD groups will also be compared to mothers of children with Smith-Magenis Syndrome, a de novo genetic mutation, to elucidate the contribution of parenting a child with an NDD to these traits.

Conclusions: The FXS premutation provides a model for autistic traits with a known genetic cause that is useful in disentangling genetic and environmental contributions to the behavioural and emotional profile of the female Broader Autism Phenotype, which should improve the support available to these groups of women.

Symposia

The self in true and false memory and its link to Theory of Mind

Marina Wimmer *University of Plymouth*

A well-established finding in human memory is that self-relevant information is better remembered (self-reference effect). The current symposium provides novel evidence of how different operationalisations of self-concept (ownership, self-image, self-action, self-agency) converge on a memory advantage in recall, recognition, and source-memory and how self-generated memories can go astray. It reveals new links between self-generated true and false memories and autobiographical memories and theory of mind developments.

In presentation 1 the self-reference effect is demonstrated via ownership. Self-owned items were better recalled irrespective of whether ownership was self-chosen or self-assigned. This novel ownership game can have useful applications in an educational setting and shows beneficial effects on children's recall performance.

Speaker 2 shows that information presented with an image of self and self-performed actions are better remembered. Importantly, this self-reference memory advantage was associated with better recall of autobiographical events and a child's self-concept. Thus, autobiographical memories are associated with the development of the self.

Speaker 3 examines how both ownership and agency (self-selected versus other-selected information) impact on recognition and source-memory. Agency played a larger role in both recognition and source-memory than ownership. Moreover, source-memory was linked to theory of mind. Findings highlight the importance of theory of mind in self-generated memories.

Speaker 4 explores the relation between self-generated false memories and theory of mind and subjective recollection versus familiarity. Self-generated false memories were less likely to occur with better theory of mind and better recollection of events. Thus, theory of mind also plays a role in self-generated false memories.

Discussant: Dr Martin Doherty, University of East Anglia

Paper 1

Self-biases in recall: Applying ownership effects in an educational context

Sheila Cunningham *Abertay University* **Jacqui Hutchison** *Abertay University*
Josephine Ross *University of Dundee* **Doug Martin** *University of Aberdeen*

Objectives: Information linked to the self activates robust processing biases in cognition, such as increased attentional focus and memory. Self-biases in attention and memory can be triggered by ownership in both children and adults (e.g., I remember the cup given to me). In the current study, we examined whether self-biases elicited by ownership could be applied in an educational context.

Design: In two experiments, children were asked to learn novel shapes presented on cards, under conditions of ownership by self, ownership by another person, or non-ownership.

Methods: Children aged 7-9 years (Exp. 1: N=30; Exp. 2: N=45) were presented with nine cards, three owned by self, three owned by the experimenter and three un-owned. Ownership was assigned on the basis of personal choice (Exp. 1) or a pre-assigned colour cue (Exp. 2). Each card showed a novel shape with a naming label. After the cards were sorted into self-owned, other-owned and un-owned categories, they were removed and the child was asked to free recall the shapes and labels.

Results: In both experiments, free recall data showed a significant memory advantage for self-owned shapes relative to other-owned or un-owned shapes.

Conclusions: Children learned novel information more effectively when the learning materials were encoded in the self-referent context of ownership. Regardless of whether ownership was assigned or freely chosen, self-owned items produced greater free recall. This suggests that ownership games could be a valuable educational tool, particularly as they are applicable across multiple learning domains.

Paper 2

Self-processing biases in event memory: Implications for the development of self-awareness

Josephine Ross *University of Dundee* **Jacqui Hutchison** *Abertay University* **Sheila Cunningham** *Abertay University*

Objectives: Linking to-be-remembered information with the self-concept leads to increased attentional focus and elaborative processing. As a result, children and adults show a retrieval

bias for information that has been linked to the self at encoding. A unique depth of processing also arise from being the agent of action, leading to a memory bias for aspects of events in which we have physically participated. These cognitive and physical self-reference effects may drive growth in the self-concept and autobiographical memory.

Design: Children completed tests designed to assess elaborative, attentional and action based self-reference effects on memory. Concurrent measurements of autobiographical memory and self-knowledge were taken.

Methods: 126 4- to 6-year-olds completed self-referent-memory tests comprising recognition of items presented (and in some cases elaboratively processed) with an image of self or another child, and recall for actions performed by self or the experimenter. Children also reported autobiographical event narratives (recalling their first day of nursery school and last birthday). To assess elaboration and organisation of the self-concept, children also provided self-descriptions and completed a standardised self-concept scale.

Results: Children showed a significant self-reference effect in all memory tests, attenuated by age only in the elaborative processing task. There were positive relationships between self-knowledge and autobiographical event narratives, and between these capacities and the magnitude of self-reference effects.

Conclusions: These results improve our understanding of the emergence of multiple aspects of self-awareness, providing novel empirical support for the theory that the offset of infantile amnesia may depend on maturity of the self-system.

Paper 3

Agency, ownership, Theory of Mind and the self-reference effect in recognition- and source memory

Ruth Ford *Anglia Ruskin University* **Sheila Lobao** *Anglia Ruskin University*

Objectives: Self-relevant information enjoys a privileged status in memory, a phenomenon termed the self-reference effect (SRE). In the present study, we evaluated the SRE in 5-to 7-year-olds (n=39; 21 boys & 18 girls) using a competitive picture-selection game which children played in pairs. The game was designed to disentangle agency (who chose each picture) and ownership (who received each picture).

Design: The study had a 2 (agency: self-selected vs. other-selected) x 2 (self-owned vs. other-owned) factorial design with two dependent measures (recognition- and source memory).

Method: Several hours later, children were shown the original pictures intermixed with 18 new pictures and for each one were asked (1) whether they remembered the picture and, if so, (2) who chose it, and (3) who received it (with counterbalancing). Additionally, the children undertook tests of cognitive and affective empathy, general ability, and inhibition.

Results: In recognition memory there was a significant SRE for agency regardless of ownership, and a significant SRE for ownership in the case of pictures chosen by the child's opponent. In source memory, there was a significant SRE for agency when pictures were self-owned. Source memory was reliably greater for agency than ownership. Additionally, correlation analyses revealed that (1) superior recognition-memory was associated with

greater affective empathy, whereas (2) superior source-memory, especially regarding who chose each picture, was associated with better cognitive empathy.

Conclusions: Results are discussed in relation to the nature of the SRE in early childhood and the importance of empathy to children's memory for social interactions.

Paper 4

Self-generated false memories and the link to Theory of Mind and familiarity and recollection

Marina Wimmer *University of Plymouth* **Harriet Kimber** *University of Plymouth*

Objectives: Five-year-olds have metacognitive insight into what constitutes a false memory ("I think he really thought he saw it"). Therefore, one might expect to be a direct link between the occurrence of self-generated false memories and insight into mental states (Theory of Mind). False memories may also be associated with how much information is recollected (remembering contextual details) or feels familiar (feeling of oldness).

Design: Children completed a recognition memory test and a second order false belief task.

Methods: 71 5-, 7-, and 11-year-olds studied semantically associated word lists in pictorial format (e.g., rye, toast, loaf; tamer tiger, cage), related to a non-presented item (bread, lion, respectively). Items either appeared as one object (one rye) or two objects (two tamers). During recognition children had to say "yes" to all previously presented items (inclusion) or "yes" to only (e.g.) one-object items (exclusion). Recollection and familiarity were derived from contrasting performance in inclusion versus exclusion and the amount of false memories (bread, lion) was measured. Additionally, second order false belief was assessed ("Mary thinks that John thinks that the ice cream van is at the park").

Results: Fewer false memories were associated with better false belief performance and better recollection that held after controlling for age. There was no association with familiarity. Additionally, second order false belief was the single best predictor of false memory formation.

Conclusions: Findings suggest that the occurrence of false memories is particularly predicted by the ability to attribute higher order mental states.

Paper

Underprepared for the real world? Single-sex and coeducational school graduates in mixed-sex situations

Ivy Wang Wong *University of Hong Kong* **Shi Yun Sylvia** *University of Hong Kong*
Zhansheng Chen *University of Hong Kong*

Sex segregated schooling deprives students of mixed-sex socialization experience, and stakeholders have thus been concerned about single-sex school students' competence in mixed-sex situations. Addressing this concern is important because life after graduation is inevitably mixed-sex. We conducted the first systematic study on heterosocial anxiety and

cognitive impairment under mixed-sex interactant conditions from 456 college students from either single-sex schools or coeducational schools. Even with demographic background controlled, we found differences in social competence into the college years that favored coeducational schooling, such that graduates of single-sex schools reported being more anxious about mixed-sex interactions. This early difference in heterosocial anxiety may be a precursor leading to the later higher prevalence of negative marriage outcomes in single-sex school graduates in prior studies. We also provide the first behavioral data on the effect of single-sex schooling on students' cognitive performance under mixed- or same-sex environments. The findings suggested that a mixed-sex condition, which is common for public tests, tended to impair the cognitive performance of single-sex school students but boost the performance of coeducational school students. However, it may be overly alarming to conclude that single-sex schooling puts students at risk of poorer performance when tested in mixed-gender groups. The effect of single-sex schooling on the susceptibility to interactant-induced impairment in testing situations was not as consistent as that on heterosocial anxiety in social situations. Nevertheless, results show that single-sex schooling experience during the formative adolescent period leaves long-term social and psychological impacts. Although stakeholders have focused on the short-term consequences of single-sex schooling, it will be important for policy makers to also consider its long-term consequences.

Poster

Development of executive function in late childhood: A cross-cultural analysis of samples from Mainland China, Hong Kong and the United Kingdom

Chengyi Xu *Centre for Family Research, University of Cambridge* **Claire Hughes**
Centre for Family Research, University of Cambridge **Michelle Ellefson** *INSTRUCT*
Research Group, University of Cambridge

Objectives: To extend the developmental scope of existing work on East-West contrasts in the acquisition and development of executive function (EF) beyond the preschool years, the current cross-cultural study focused on late childhood and early adolescence. Building on reports of substantial contrasts in performance on computerised EF tasks among school-aged children in Hong Kong and the United Kingdom (Ellefson, Ng, Wang, & Hughes, article in press), the current study gathered new data from children living in a traditional community in Mainland China (where access to computers is much more limited than in either Hong Kong or the United Kingdom).

Design and Methods: In whole-class sessions, 670 children (UK: N=278; HK: N=262; Mainland China: N=130), split equally by gender and across three different school years 5, 6 and 7, completed a 25-minute online EF battery that included tests of working memory, inhibition, shifting and planning.

Results: British children's EF performance lagged significantly behind that of both East Asian groups. Despite a lack of access to computers, children growing up in Mainland China performed as well as their counterparts in Hong Kong, with both groups providing very fast and accurate responses.

Conclusions: Asian children's advantage in EF skills appears to persist into late childhood and early adolescence; this advantage cannot be simply explained by contrasts in access to

computers. Together, these findings support the feasibility and validity of administering computerised EF tasks to children from different cultures.

Symposia

Tools, tablets and technologies: Navigating between 2 and 3 dimensions in children's sensori-motor interactions with the world

Nicola Yuill *University of Sussex*

Children's learning interactions are increasingly mediated digitally through the 2 dimensions of a screen. Piagetian theory and more recently dynamical systems approaches place a premium on learning about the world through sensori-motor interaction with 3-dimensional objects. We present four different explorations in understanding the different affordances of interactions with the digital and the physical for our understanding of children's exploration and innovation and more generally our understanding about the role of technology in understanding child development:

- 1) the role of physical and social properties of objects in young children's tool innovation,
- 2) how parents scaffold toddler's interactions with digital technology vs. toys
- 3) differences in shared reading interactions with physical and digital books
- 4) the role of physical interaction in the design of interactive museum exhibits for science learning in preschoolers.

The discussion will aim to draw out what are the different properties of digital and physical, the role of the physical world in the development of tools in humans, implications of the physical and digital for supporting the development of children's thinking, and for designing educational technology. The papers were not conceived from a single underlying perspective: their juxtaposition in this symposium is intended to stimulate a discussion about how to we can improve our understanding of children's development and learning about tool use in a technology-rich world by bringing together different theoretical perspectives.

Paper 1

Social influences on children's tool innovation

Nicola Cutting *School of Psychological and Social Sciences, York St John University* **Ian Apperly** *School of Psychology, University of Birmingham* **Jackie Chappell** *School of Biosciences, University of Birmingham* **Sarah Beck** *School of Psychology, University of Birmingham*

Objective: Children easily learn about tools from others, but have difficulty innovating tools independently. The current study combines these research areas to explore the social influences on children's ability to innovate their own tools from already modified materials.

Design: The study adopted a between-subjects experimental design. Children took part in one of three conditions (Oversize, Twist or baseline).

Methods: Five- to- eight-year-olds (N = 163) were presented with a tall narrow tube with a bucket containing a sticker placed in the bottom. Children were tasked with retrieving the bucket from the tube (achieved by making a small hook from the given materials). Children were presented with an oversize hooked pipecleaner (too large to retrieve the bucket) and a straight pipecleaner (oversize condition), a twisted pipecleaner and a straight pipecleaner (twist condition), or two straight pipecleaners (baseline).

Results: Children were more successful at innovating a functional hook in the baseline condition (62%) rather than in the oversize (25%) or twist (25%) conditions ($p = .006$). Examining behaviours more closely shows that children's first material choice in the oversize condition was the hook rather than straight pipecleaner ($p < .001$), but material choice was at chance in the twist condition.

Conclusions: Children were drawn to modified materials when recognised as the right sort of tool for the job (oversize-hook condition). This cannot be explained by the fact modified materials looked made or were more interesting (no preference in twist condition). The presence of pre-modified materials hindered ability to innovate functional tools.

Paper 2

Parent support for very young children's interaction with digital technology

Amanda Carr *School of Psychology, Politics and Sociology, Canterbury Christ Church University*

Objective: Touchscreen technology potentially affords very young children a developmentally appropriate means of interacting with digital content through sensorimotor exploration. However, limitations in fine-motor and cognitive development inevitably constrain the extent to which these early digital interactions are meaningful. This study examines how parents scaffold children's early understanding and interaction with digital technology by examining parent-child play in digital (tablet) and physical (toy) contexts.

Design: A quasi-experimental, between-subjects design with two play conditions: tablet versus toy.

Methods: Parent-child interactions were recorded in an observation lab. Each session lasted about an hour and comprised periods of parent-child play (tablet versus toy), parent questionnaires and individual child assessments. Across both studies children ranged in age from 10 – 42 months (N = 30).

Results: Interactions were coded for parental support, joint attention, positive and negative affect and engagement. Results suggest that the youngest children needed significant support, with both the physical and cognitive dimensions of the task, with some of the very youngest never managing meaningful interactions with the tablet despite parental help. We observed a mark difference in children's ability to master the technology, and thus engage in more meaningful interactions at around 18 – 24 months. From age 2 parental scaffolding focused on maintaining engagement with the content of the games, with frequent episodes of successful joint attention observed.

Conclusions: Although very young children, even infants, are using touch screen technologies with increasing frequency, meaningful engagement is largely dependent on parent support, comparable to early play in general.

Paper 3

Embodied engagement: Differences between mother-child shared reading on text and screen

Nicola Yuill *Children and Technology Lab, Psychology, University of Sussex, Brighton*
Alex F. Martin *Kings College London*

Objectives. There is conflicting data on how reading is different on screens and paper. We assessed how the medium of paper or screen might alter children's shared reading experiences in mid-childhood, as children become independent readers.

Design. Twenty-four 7- to 9-year-old children and their mothers were videotaped sharing a storybook for 8 minutes in each of 4 counter-balanced conditions: mother or child as reader, paper or tablet screen as medium.

Method. We rated videotapes for interaction warmth and child engagement by minute and analysed dyadic postural synchrony, mothers' commentaries and quality of children's recall, also interviewing participants about their experiences of technology.

Results. We found no differences in recall quality but interaction warmth was lower for screen than for paper, and dropped over time, notably when children read on screen. Interactions also differed between mother-led and child-led reading.

Conclusions. We propose that mother - child posture for paper reading supported more shared activity and argue that cultural affordances of screens, together with physical differences between devices, support different behaviours that affect shared engagement, with implications for the design and use of digital technology at home and at school. Shared reading with a parent is an engaging, affective and embodied experience across time, as well as a cognitive task, so it is important to understand how paper vs. screen affects broader aspects of these shared experiences. We advocate studying embodied and affective aspects of shared reading to understand the overall implications of screens in children's transition to independent reading.

Paper 4

Move2Learn: The opportunities and potential risks of designing technologies to foster meaningful actions

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Purpose: In this paper, we critically evaluate the cognitive arguments surrounding the opportunities of emerging body-interactive technologies for developing children's science learning within an embodied cognition framework.

Background: Work in the field of embodied cognition suggests that physical interaction may enable children to internalise particular sensorimotoric experiences that help structure and communicate their thinking. Evidence includes subsequent gesturing when expressing thinking, whereby gestures often simulate prior physical interaction. This work has significant implications for digital tools. Screen-based tools such as tablets, for example, may constrain the types of actions, and simulated actions, children generate from interaction alone or with another. Emerging technologies, e.g. gesture recognition, address this limitation by enabling designers to capture and respond to particular actions, enabling a new generation of 'embodied learning technologies'. However, there are reasons to be cautious. Educational research has suggested a cognitive trade-off between encouraging children to practise particular 'efficient' strategies, and encouraging children to explore, reflect and constrain their own strategies.

Methods: We draw upon a literature review from a three-year UK/US collaborative Science Learning project examining how interactive museum exhibits, designed to encourage meaningful actions, can help young children express, communicate and develop their scientific thinking.

Conclusions: Extrapolating this work might imply that designs, be they touchscreen or gesture recognition, that encourage specific actions, may be prioritising teaching of efficient strategies at the cost of enabling the cognitive benefits of more creative innovation.

Poster

Autism in Sync REActivity – Assistive technology for ASD children

Nicola Yuill *University of Sussex*

Objectives: We aim to investigate whether the system leads to improvements in cognitive, behavioural, social and communicative potential.

Design: The system is designed to be non-intrusive and support the child/adult with ASD and another (peer, therapist, parent). The system is versatile, giving the opportunity to develop either play- or task-oriented interactions with peers or adults.

The system:

1. Tracks and distinguish human figures
2. Generates sound in real-time following the gestures detected
3. Provides statistical analysis of log data.

Methods: The software captures the movements of the child, and extracts 2D movement coordinates from the video. It links these mathematical vectors to sound production. The child can thus generate music by moving freely or being guided in different harmonious ways. The study design consists in a sample of 10 ASD children, Boys N = 8, Girls N = 2, 1 session, 1 age group (6-10 years old).

Results: Observation suggests that 10 case studies exhibited very anxious and resentful children unfold and respond to adults and peers. A qualitative observation of the case

studies displayed an increase in eye contact, attention sharing and taking turns. The system may improve social behaviours.

Conclusions: This study suggests that improving interpersonal synchrony in children with autism might also improve other related abilities such as social and communication skills. The versatility of our system helps to facilitate the relation and contingency between other children as well as with therapists or parents. However, a controlled study is needed to evaluate the potential benefit.

Poster

Beyond the right hemisphere: brain mechanisms mediating vocal emotion processing during infancy

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Objectives: Vocal emotional expressions represent salient social signals serving adaptive functions in typical development. However, little is known about the developmental origins of emotion processing from pure prosody (non-linguistic vocalisations) in the infant brain. The current study aimed to extend previous research by examining infant brain responses to prosodic vocalisations. This study is the first attempt to isolate prosody-specific effects by adopting stimuli which contains prosodic information devoid of linguistic content.

Design and methods: 29 typically developing healthy infants of healthy mothers at the age of 6 months participated in the study, infants' brain responses to pure emotional prosodic vocalisations were examined by using near-infrared spectroscopy.

Results: Our findings show that at 6 months a channel in the left hemisphere shows larger response to vocal anger (channel 2, $F(2, 56) = 3.38, p = .040$) while channels in the right hemisphere show larger response to happy prosody (channel 14, $F(2, 56) = 3.24, p = .047$); channel 16, $F(2, 56) = 4.38, p = .017$).

Conclusions: Our findings suggests that very early in development left temporal regions may specialise in processing vocal anger while right temporal regions may specialise in processing happy prosody. It is possible that specialisation of the right hemisphere in processing anger prosody develops between 6 and 7 months. Findings from the current study may provide neural markers to aid early identification of those infants who are most likely to express risk for neurodevelopmental disorders.

