



Early-career Social Learning Researchers

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Department of Human Behavior, Ecology and Culture

Poster Abstracts

Alba Motes Rodrigo (University of Tübingen)

On the imitative abilities of captive chimpanzees

The ability for spontaneous imitation (including the ability to copy actions) in non-human great apes is still a controversial topic. The results of earlier studies suggest that several factors (both action specific and subject specific) influence the probability that great apes imitate an action. However, these factors have not been tested combined in a single great ape population. In addition, a previous study that reported spontaneous imitation in chimpanzees presented methodological limitations, which should be addressed in a replication. We are planning to conduct an experiment with 33 captive chimpanzees in order (1) to assess if chimpanzees and/or zoo visitors spontaneously imitate any actions of the other species (a replication of Persson et al. 2017), (2) to test if human biases exist in perceiving that chimpanzees imitate visitors (3) to determine if chimpanzees imitate actions performed by human demonstrators when the apes are tested individually. If evidence for imitation of demonstrated actions is found, we will further aim to determine (4) if the level of enculturation influences chimpanzees' imitative abilities (following Tomasello et al. 1993), (5) if chimpanzees engage in familiar actions imitation, novel actions imitation or both (following Byrne and Tanner 2006), (6) if certain actions are imitated depending on the actions involving contact or not with the subjects body (following Call 2001) and finally, (7) if certain actions are imitated depending on the actions having environmental effect (sound) or not – as sound reproduction can be done via emulation instead. This study will allow us to test in combination the various hypotheses currently present in the literature regarding the imitative abilities of chimpanzees for the first time in a single population of 33 individuals.

Cameron Turner (Australian National University)

Eavesdropping by Heterospecifics

While much theory has examined the conditions selecting for the evolution of signalling within species, little formal work has examined the conditions favouring learning from the calls of other species. Such eavesdropping is widespread and important in nature. Both of two heterospecifics species may call and respond to each other's calls. However, asymmetries also often exist in which one species will have calls eavesdropped on by another species to which they themselves do not respond. It has been hypothesised that asymmetries in eavesdropping may exist because of differences in the reliability of calls for species with different predators and predation risk. Here we examine through formal modelling how differences in predation risk influence call reliability and asymmetries in eavesdropping between species.

Anne Sibilsky (Leipzig Research Center for Early Child Development, University of Leipzig)

Social Learning in a Culturally Diverse Country

When learning from their peers, children often preferentially copy the majority of their group, sometimes even against their own preference (conformity). This social learning strategy has additional consequences beyond the individual level: Henrich and Boyd (1998) proposed that the way in which people learn from others determines patterns of population level variation. The current study investigated social learning, and its role in shaping societies, in children from 5 different populations in Vanuatu, a country with uniquely prominent differences across communities. With over 100 languages spoken by only 270,000 inhabitants, and an extraordinary diversity in local customs and traditions, Vanuatu is uniquely suited for studying the mechanisms behind population level variation. We tested 4- to 13-year-olds' social learning via two previously used paradigms of developmental psychology: In task one, we investigated preferences for social learning and tendencies to follow a majority of demonstrators of 270 children using a validated social learning task (see Haun, Rekers & Tomasello, 2012 and van Leeuwen et al., 2018). In task two, we assessed conformity of 77 children with a child-friendly version of the Asch paradigm (see Haun & Tomasello, 2011). As has been documented in previous studies, we find population differences in developmental trajectories of children's tendency to use social information when acquiring a new skill. Also similar to previous findings, children's majority preference varies to a minor extent across populations. Surprisingly, however, majority preference is overall low amongst Vanuatu children in comparison to previous samples. Children's conformity (copying the majority against their preference) strongly differs between the 5 populations (mean rates between 13% and 37%). Children's conformity correlates moderately with social information use and preference for majority. By the time of the workshop, we expect results on which village characteristics account for these differences.

Sarah Marie Peoples (Leipzig Research Center for Early Child Development, University of Leipzig)

The preference for games in two non-WEIRD cultures

Games are played across a broad range of cultural contexts and vary with cultural attributes, such as political stratification, child-rearing practices, and religious beliefs. However, few studies have examined the games played in egalitarian, hunter-gatherer societies in comparison to hierarchical societies. The current study experimentally investigates the relationship between cultural values of social stratification and interdependence, and the preference for games in two non-WEIRD populations. We expected the Hai||om of Namibia, a recent hunter-gatherer and egalitarian population, to prefer cooperative games more than their Owambo neighbors, a recent agro-pastoralist and socially stratified society. Children between the ages of 7 and 14, and their parents, were asked to play a cooperative and a competitive version of a game, after which participants then chose their preferred game. Data collection is currently ongoing and preliminary results will be presented on the poster.

Camille Belmin (Potsdam Institute for Climate Impact Research, Humboldt Universität zu Berlin)

A socio-metabolic perspective to the cultural evolution of fertility

The decline in human fertility observed during demographic transitions has long fascinated cultural evolution scientists. Researchers of this field developed refined theories and models to analyze interactions between fertility decline and cultural processes [Colleran 2016]. However, humans are also subject to physical constraints, which are preconditions to the possibility of the emergence of a certain culture -- a key finding from the conceptual framework of social metabolism [Fischer Kowalski and Weisz 1999] and [Weisz 2011]. In this context, what is the role of energy availability in the fertility decline observed during demographic transitions? We reviewed the literature on the fertility evolution under the agrarian and the industrial socio-metabolic regimes and cross-analyzed it with literature on social metabolism. First, we find that energy availability is a pre-condition to sustained low fertility: during the shift from agrarian to industrial regime, the decrease in energetic constraints enlarges the sphere of possibilities regarding fertility. In an agrarian regime, the need for labor constrains fertility to high levels. The upsurge in energy use due to fossil fuel expansion in the shift to industrial regime decreases the need for human labor and therefore large families, and changes time allocation in human activities which enables a rise in education, and in women's self-determination regarding their fertility. Then, in the discussion, we identify two cultural evolution processes that could have a particular strong link with energy availability: (i) via an influence on the selection of norms on fertility; (ii) by enabling unprecedented social learning through modern communication systems. In addition to having great importance for policy making (access to energy can foster demographic transitions), these insights open a new perspective for social learning research on how social norms could be influenced by energetic constraints.

Gustavo Landfried (Universidad de Buenos Aires)

A state-of-the-art Bayesian skill estimator to study social learning on cultural evolution contexts

Humans accumulate, process and transmit knowledge across generations as a distributed natural information processing system in which well-adapted tools, beliefs and practices arise as emergent properties of the social system. In order to study human adaptive success in cultural evolution contexts, we need to count on a reliable skill estimator. Firstly, we offer a technical report of the state-of-the-art Bayesian skill estimator. Secondly, we quantify the impact of grouping strategies on an online multiplayer game where players can participate individually or in teams. We found a skill boost effect on stable teammates during the first games of experience equivalent to the skill that is acquired only after thousands of games of individual experience.

Charlotte Elizabeth Holmes Wilks (University of Stirling)

Find the treasure: Children's use of social information in a Stimulus Selection Task

Humans appear to be unique in their ability to accumulate beneficial modifications, over generations of learners, through social transmission. This has been termed the ratchet effect. It has been demonstrated experimentally in adult participants, but it is currently unknown at what age children develop the ability to produce such an effect or what cognitive capacities may underlie it. We investigated potential for ratcheting (PFR) in 160 UK children (aged 3-6) by exposing them to social information in a treasure-island themed Stimulus Selection Task. Over three rounds, social information contained different numbers of correct and incorrect selections, enabling us to examine PFR from the data of individual participants. We were interested in children's ability to remember and use this information to inform their own search. We therefore analysed performance following correct/incorrect demonstrations when visual working memory was, or was not, taxed. When accurate performance was memory-dependent, error rates for correct trials varied between 53% (age 3) and 17% (age 6). However, upon virtually eliminating this memory load (transparent condition), even the youngest children used both correct and incorrect social information almost at ceiling level. Additionally, we used children's scores on the three rounds to assess their PFR according to defined criteria. We again found evidence that performance was linked to task memory load: over 85% of children displayed PFR from age 3 in our transparent condition, but the point at which most children displayed PFR shifted to age 5 when memory was taxed. We conclude that constraints on visual working memory may limit the contexts in which children exhibit PFR. Social information is often available for a limited time, so demands on memory may mean nonhumans (and young children) fail to benefit from potentially useful information. Memory may have been overlooked as a key requirement for exhibiting a ratchet effect.

Roman Stengelin (Leipzig Research Center for Early Child Development, University of Leipzig)

Spatial proximity between Hai||om mothers and infants over the course of a day

Beginning at birth, children are embedded in complex cultural environments that shape what, how, when, and by whom they can learn. Yet, relatively little empirical research has been done in the context that is arguably most closely resembling the subsistence system under which humans mostly evolved: Hunter-Gatherers. Here, I present preliminary data from a study in which we tracked the spatial proximity between mothers and infants in a recent hunter-gatherer society, the Hai||om of northern Namibia. The study was conducted in February-April 2019.

Dugald Foster (University of Exeter)

Microfinance and Macrobbehaviour: Pre-registration for an Evolutionary Analysis of Cooperation among Microfinance Borrowers

This poster presents plans for a study yet to be undertaken, with the aim of soliciting feedback on the study design, conceptual framework, and statistical methods at a stage when it will be most useful.

Introduction: In 2016, over 120 million people took out microfinance loans. By providing access to credit for those excluded from traditional financial services, microfinance institutions (MFIs) seek to alleviate poverty by developing economic self-sufficiency. Despite mixed evidence on the impact of microfinance loans (Meager 2019), demand for microfinance remains high. The proposed study will analyse factors affecting loan repayment, with an aim to: (1) Compare evolutionary and economic predictions of mechanisms underlying human cooperation; (2) Provide MFIs with suggestions for improving loan design to increase repayment rates; (3) Demonstrate the potential of evolutionary theory as a unifying framework for generating hypotheses relevant to human development issues

Methods: (1) Meta-analysis of loan repayment studies to date, with the aim of identifying average effects of variables on repayment, and to assess the uncertainty, heterogeneity and generalizability of these effects. Statistical methods include Bayesian hierarchical models and/or network meta-analysis methods.

(1) Analysis of multilevel observational data from MFIs to test our causal models of variables affecting loan repayment. (3) Analysis of institutional-level data from MFIs to investigate cultural evolutionary dynamics operating within and between institutions. (4) Conduct an RCT in collaboration with an MFI, informed by results from 1, 2 and 3.

Questions include: What is the best way to measure cooperation within a loan group? Is a meta-analysis feasible for this study question? Should I include data from observational studies? What are the advantages of Bayesian hierarchical models over alternative methods such as network meta-analysis?

What is the ideal role of pre-registration in an evolving scientific project? What is the potential for evolutionary anthropology research to inform public policy? - Demonstrate the potential of evolutionary theory as a unifying framework for generating hypotheses relevant to human development issues.

Emily Messer (University of Texas at Austin)

Does generosity follow generosity? The selective transmission of prosociality in groups of young children

The current study presented groups of five and seven year old children with a resource distribution task in the novel context of a linear diffusion chain. At the outset of each chain individual A was asked to make a fixed choice donation between two different payoffs for individual B, before individual B was asked to donate to individual C, and so on along a chain of five individuals. The results suggest that the groups of younger children became increasingly prosocial as the chains progressed, a pattern of donating behaviour that was not witnessed in the older groups, where the level of donating, although higher than that displayed by the younger children, remained relatively flat. We suggest that the positive increase in prosociality in the younger children is a consequence of downstream indirect reciprocity, where children 'overlook' the personal receipt of negative donations in order to enhance their reputation within the social group.

Gemma Mackintosh (University of Stirling)

Does intentional communication facilitate cumulative cultural evolution in children?

Cumulative culture is widespread in humans, but not apparent in other animals. One potential explanation for this is that humans are unique in communicating to inform. Previous research has demonstrated that this capacity does facilitate cumulative cultural evolution in human adults, and that this can be attributed to theory of mind reasoning, which not only allows the information sender to tailor signals to the needs of the learner, but also allows the learner to infer more from a limited subset of information than what is available. While there are numerous accounts of the emergence of theory of mind reasoning in children, it is not clear at what point this begins to influence the ability to send intentional communication that aims to benefit the learner. This series of studies will use an experimental transmission chain design to investigate the point in development where intentional information sending begins an accumulation of beneficial information, relative to transmission via inadvertent information. Similar to previous tasks run with adults, participants will complete a landscape-searching task, scoring points by finding hidden targets. Information will be transmitted between participants such that receivers are informed of the results of part or all of their predecessor's search attempt. There will be three information conditions: Intentional, Inadvertent, and Full. In the Intentional and Inadvertent conditions, a small subset of the search will be transmitted to successors, either selected by the information producer themselves for informativeness (Intentional), or randomly sampled from their full search history (Inadvertent). In the adult sample, it was concluded that intentional information sending led to an increase that was comparable to when full information from a previous participant's search was available, thus indicating that intentional information sending does promote cumulative cultural evolution. Preliminary results from the follow up child study will be reported.

Haneul Jang (MPI for Evolutionary Anthropology)

Comparison on spatial movement patterns between human foragers and chimpanzees when they travel to food locations in rainforests.

Humans have unique ranging behaviors such as a semi-nomadic lifestyle, central place provisioning, and extensive trail use. Yet, little is known about how these behaviors have influenced spatial movement patterns in humans. Here we compared large-scale spatial movement patterns between the Mbendjele BaYaka people in the Republic of Congo and Tai chimpanzees in Côte d'Ivoire in daily foraging contexts in rainforests. We compared how linearly and rapidly human foragers and chimpanzees moved towards food locations. We tested how travel linearity and speed change upon the level of familiarity with an area (the sum of time spent in the area) and group composition. We found a clear species difference in the effect of familiarity and group composition on linearity and speed. The Mbendjele traveled linearly and rapidly in familiar areas, but decreased linearity in less familiar areas, perhaps due to a large life-time range in humans. Yet humans increased linearity and speed when they were with more group members, probably by compensating their lack of knowledge in less familiar areas with the knowledge of others. In contrast, chimpanzees increased linearity and speed in less familiar areas, probably due to the risk of inter-group encounters. Our study suggests that these different impacts of familiarity and group size in Mbendjele people and Tai chimpanzees reflects their different foraging styles, such as home range size and trail use.

Hanna Schleihau (Max Planck Institute for Cognitive and Brain Science)

A dual-process model for over-imitation

Children and adults tend to imitate actions that are irrelevant to accomplishing a goal, they “over-imitate”. It has been discussed that humans overimitate either because of erroneous causal reasoning, meaning that they do not recognize demonstrated actions as being irrelevant or because of social motivations, e.g., because they want to follow a norm or want to affiliate with the demonstrator. Recent findings give reason to think that one of these accounts standing alone is insufficient to explain the phenomenon. Here we introduce a dual-process model for overimitation. In the process of blanket copying, irrelevant actions are copied independent of contextual differences. While copying in a blanket fashion, children imitate irrelevant actions without questioning their necessity. This process is triggered by actions which involve physical contact with the testing object, because it is harder to recognize such actions as being irrelevant. In the process of reflective copying, copying of irrelevant actions is context depended. In this process, whether children overimitate is dependent on their goals in a certain situation. This process of copying is triggered by actions that do not involve physical contact with the testing object and are therefore easily recognized as being causally irrelevant, implying that they might instead be socially relevant. According to this integrative framework, overimitation can occur with different underlying motivations.

Jana Hörsch (MPI for Animal Behaviour)

How does social influence affect performance on a human recognition task in wild urban-living cockatoos (*Cacatua galerita*)?

Human induced rapid environmental change causes not only destruction but also the creation of new opportunities. Some species are better at adapting and surviving in these new habitats than others. Previous work has suggested that cognitive skills could provide an advantage when facing those novel challenges and opportunities. For instance, animals in urban areas live in close proximity to humans. However, people vary considerably in their behaviour towards animals. Therefore, it would be advantageous for urban living animals to learn to distinguish between persons in order to respond appropriately towards specific humans (e.g. flight or approach). In addition to individual learning, social information from conspecifics could play a potentially important role in this decision-making. I investigated these questions in the highly social and cognitively-complex sulphur-crested cockatoo (*Cacatua galerita*), a successful invader of urban environments across the Austral-Pacific. The native population of Sulphur-crested (S-C) cockatoos in the Sydney region of Australia, approach people in order to get desirable food, but are also persecuted, for example as crop raiders. Using this population, I first tested whether S-C cockatoos are able to learn to distinguish between individual humans over the course of 14 sessions over 7 days of a two-choice experiment, where 76 individually-marked birds were randomly assigned to be only fed by one of two people. Second, by manipulating whether how birds were assigned across the two provisioners, I asked whether social influence plays a role in individual decision-making; specifically, whether conflicting personal and public information interferes with this learning process.

Joanna Bury-Weitzel (university of York)

Helping, Sharing, and Comforting Behaviours in Ugandan and British Infants

Studies in recent years have shown that children engage in prosocial behaviours (e.g., helping others achieve their goals, sharing valuable resources with others, and comforting individuals in distress) from very early on in their development. It still remains an open question though to what extent prosociality is an innate behaviour and how much of it is established through socialisation processes. Therefore, I am planning to conduct a study on the development of prosocial behaviour with children of two different cultural backgrounds. In order to understand more about the importance of socialisation processes in the emergence of helping, sharing, and comforting behaviours, I will work with parents who have very different socialisation goals and show different parenting practices. I will be following mother-infant dyads in Uganda and England for the first two years of the infants' lives and examine mothers' expectations and behaviours concerning prosocial behaviour in their children. I will ask mothers about their socialisation goals and interview them regularly about prosocial behaviours their children might be showing in their everyday lives. Additionally, I intend to observe and test the infants' actual prosocial behaviours towards both their mother and an experimenter in a set of experiments. I will also film everyday interactions between mother and child every three months and identify opportunities as well as actual instances of prosociality between the two. This longitudinal, cross-cultural study, which encompasses observational, interview, and experimental data, should allow for new inferences about the way helping, sharing, and comforting emerge and develop throughout infancy and give us new insights into the ontogenesis of prosociality.

Jonathan St-Onge (Université du Québec à Montréal)

A Bayesian Case Study: Generative models of Sally Clarke's case

In 1996, Sally Clark's first child died of Sudden infant death syndrome (SIDS) at 11 weeks of age. Then, about a year later, she had another child, who also died of SIDS at 8 weeks old. In both cases, she was home alone when it happens. Suspicion aroused, and Clarke was tried for double murder. Motivated by a Bayesian conundrum that followed the story, I consider the R. vs. Clark as a case study to demonstrate the necessity to go from theory to data and back again, even in some unexpected situations. Characterized by a normative context and lack of experimental data, I suggest that Clark's case is not unlike those we can see in empirical work of cultural evolution theory. As is often the case, the R. vs. Clark case was framed in terms of a signal detection problem by Bayesian epistemologist—given a noisy signal, what should we believe about the underlying true state of affairs. To achieve the best answer, one uses Bayes theorem with knowledge of the correct base rate—how often two successive SIDS events happen in a population—to infer the answer. The conundrum came when two famous Bayesians could not agree on the right answer, partly because they fail to agree on the good priors. I will put aside this version of the story, and show that even in this case it is now possible—thanks to inference technique like Hamiltonian Monte Carlo—to go from theory to data and back again. To do so, I will offer different possible generative models (models that we can sample from) to capture different set of assumptions, from simple to more complex, about Clark's case. This case study aims to exemplify the virtues of principled (generative) model building in less than ideal empirical context, as found in cultural evolution theory.

Julia Penndorf (MPI for Animal Behaviour)

A COMPARISON OF SOCIAL INTERACTION NETWORKS IN A WILD, URBAN DWELLING PARROT

Parrots appear to represent an independent evolution of cognition, and with corvids, are outliers amongst birds for their large relative brain sizes and high density of neurons. Additionally, parrots share many life history traits proposed to be important for the evolution of intelligence, including extended developmental periods and longevity. However, while social factors have also been implicated for primates (e.g. social intelligence and cultural intelligence hypotheses), detailed information regarding social structure is largely lacking for parrot species, especially in the wild. Here we present what we believe to be the first study examining detailed social interactions in a wild, urban-dwelling parrot species, the sulphur-crested cockatoo (*Cacatua galerita*). We (i) quantify social organization during foraging of three habituated flocks (n=402), (ii) describe the form and distribution of affiliative and agonistic interactions, and (iii) measure the dominance hierarchy within each flock. Finally, we synthesize these results and discuss their implications for social cognition in this species.

Juliet Dunstone (University of Stirling)

Selective copying strategies are harder than the sum of their parts – exploring the relationships between explicit metacognition, executive functions and selective copying

The use of explicitly metacognitive learning strategies has been proposed as an explanation for uniquely human capacities for cumulative culture. Such strategies are proposed to rely on the use of executive functions (EF) and explicit, system-2 metacognitive processes, to enable advantageous selective copying. To investigate the plausibility of this theory, participants' ability to make flexible learning decisions and accurate metacognitive judgements under EF-resource load was investigated. Participants completed a simple win-stay lose-shift (WSLS) paradigm task, intended to model a social learning situation where vicarious information can be used to inform response choice, by copying rewarded responses and avoiding those that are unrewarded. Participants were split into different strategy groups: those that should use a flexible WSLS strategy and those that should not. This was completed alongside a concurrent EF distractor task that required participants to respond to audio tones, and switch their response action when instructed. There were significant effects of EF load and strategy group; using a flexible strategy was more challenging than using one rule consistently, and copying was less challenging than avoiding stimuli selected in the information trial. However, each information condition was equally affected by competing EF demands. A significant training effect was also evident. These results suggest that learning decisions are underpinned by the use of executive functions even at a very basic level, but we found no evidence that flexible learning strategies relied on executive functions any more than did non-flexible strategies. However, the observed learning effects suggest that ceiling effects could be masking differences between conditions which might be apparent in other contexts. Ongoing work employing more challenging tasks may find that selective copying relies on the same cognitive requirements as explicit metacognitive decision making.

Justin Yeh (MPI for Evolutionary Anthropology)

Mistaking packaged transmission for conformity

In cultural evolution, low diversity is often attributed to conformity. However, there may be another mechanism that lead to low diversity: cultural traits being transmitted together in a package due to institutions, media that store information, and cognitive mechanisms such as overimitation. We build an agent-based simulation that allows formation and breakage of such links to explore their effects. We model transmission with or without conformity, with varying amount of links. During transmission, one randomly selected trait, along with all other traits that are directly or indirectly connected to it, are learned together in a package.

Kirsten Blakey (University of Stirling)

Strategically seeking and using social information

Selective social learning allows human adults to filter out less useful aspects of available information, therefore enabling them to actively seek and effectively use that which is most relevant. The majority of developmental social learning paradigms examine children's responses to information specifically provided for use in a particular task, but do not address children's ability to seek out the information for themselves. This study explores how 3-to-8-year-old children's choice of social model influences appropriate information seeking and the subsequent use of information provided in demonstration videos. To assess children's ability to seek out the appropriate social information we present children with a box locked with a distinctive padlock, along with a correct and an incorrect key. Children are required to select and watch one of four possible demonstration videos before selecting one of the keys in an attempt to unlock the box. Each video depicts a demonstrator with their own box and keys, followed by their selection of a key to try and unlock their box. Three distractor demonstrators have different boxes and keys to the children, while the target demonstrator has the same box and keys therefore providing useful information about which key will unlock the box. The age and gender of the target demonstrator varies across four trials, as does the demonstrators success in selecting the key that unlocks the box. We expect that appropriate social information seeking will increase with age, and that following successful seeking, older children will be more successful in using the observed information. We also hope to identify if any model based social learning strategies are hindering children's ability to appropriately seek and use the available information.

Maleen Thiele (Leipzig Research Center for Early Child Development, University of Leipzig)

13-month-old's visual learning is reinforced by social interaction targets

Infants preferentially orient their attention toward people engaging in social interaction with one another. Given its importance for early observational learning processes, it is conceivable that this preference for social interactions is accompanied by an increased readiness to learn, such as ostensive cues increase infants' responsiveness to social cues in active social interactions. In testing this assumption, we assessed 13-month-old children's visual learning performance in an associative visual learning task (N = 32; 16 females). During 24 trials, one of two different non-social cues (triangle or circle) appeared in the center of a screen. Once the child looked at it, the cue disappeared, and one of two different target videos appeared left or right from the cue: one video showing two adults turning toward one another engaging in a social interaction (touching their hands, leaning toward one another), and the other video showing the same two adults performing the identical movements while standing back-to-back. We found faster saccadic latencies (ms) toward the cued target region during social interaction trials (M = 1114.47, SD = 51.84) compared to non-interactive control trials (M = 1286.72, SD = 22.06, $\chi^2(1) = 9.61$, $p = .002$, estimate = -167.97, SE = -3.29). First-trial analyses further revealed that this difference was not present initially ($\chi^2(1) = 3.47$, $p = .06$), suggesting that it emerged during the learning task. The number of anticipatory eye-movements was significantly greater in the social interaction condition (mean proportion = .45, SD = .35) compared to the control condition (mean proportion = .17, SD = .20; $\chi^2(1) = 8.78$, $p = .003$, estimate = 1.90, SE = .62). Our findings suggest that the possibility to watch others' social interactions fosters infants' visual learning abilities. We discuss this pattern as an adaptive mechanism to maximize the learning benefit from observing others' interactions.

Nicolas Araneda Hinrichs (Universidad de Concepción)

New Materialism on Social Cognition

Low-level descriptions of individual or group interactions are performed in trending cognitive neuroscience through state of the art techniques and methodologies. These observations can be defined as being close to the material niveau of the structure and functioning of our organism as a biological entity. Conscious processes like states of emotion, perception or belief formation -all of which motivate human behavior- transcend the reach of this scope, nonetheless. Thus, the general claims made about these epistemic constructs, as a whole, should be more qualified. For instance, psycholinguistics used to be quite English based and postulated general principles of which later turned to be proven that they were not replicable with other languages. Psychophysical cues in language processing need to be redefined epistemologically from a new materialistic perspective, in order to account for group learning and social transmission of knowledge. Theory of enaction/embodiment has provided the starting point for such a cognitive science of culture; it is the aim of this article to posit the relevance of said endeavor through neuroanthropology and the notion of "intersubjective affordances".

Marco Smolla (University of Pennsylvania)

How cultural dynamics affect population structure

Cultural evolution relies on the social transmission of cultural traits (knowledge, beliefs, ideas, skills) across a population. Cultural traits diffuse along the edges of social networks that emerge from the non-random interactions between individuals. While previous studies have shown that the structure of interaction networks affects information spread in a population, and thus its ability for cumulative culture, it remains largely unclear how the network structure itself is driven by population-culture co-evolution. Using a simple but realistic model of complex dynamic social networks, we investigated how populations negotiate the trade-off between acquiring new skills and getting better at existing skills, and how this trade-off, in turn, shapes the social structure of the population. Our results reveal unexpected eco-evolutionary feedback from culture onto social network structure. We find that selecting for skill breadth (generalist world, favouring the maintenance of new innovations in the population) results in sparsely connected networks with high diversity between individuals' skill sets, whereas selecting for skill depth (specialist world, favouring high proficiency in a given skill) results in densely connected networks and a population that specializes on a few skills on which everyone is an expert. Interestingly, we find that the latter scenario can act as an "ecological trap" where it can take a long time for a specialized population to switch to new skills and adapting to a generalist world once the selective environment changes. Our model advances our understanding of the complex feedbacks in cultural evolution and demonstrates how individual-level behaviour (trait acquisition) can lead to the emergence of population-level patterns (population structure).

Marianne de Heer Kloots (University of Amsterdam)

Language learning and use in group communication games

Potentially the most useful but intricate of all culturally transmitted human behaviours are our languages. We learn and adopt features in the languages we use from our parents, but also from other peers in our social environment. Some features in which languages themselves differ, might be explained by differences in the social structure of the communities using those languages. Our communication systems are shaped through a trade-off between pressures for learnability and usability, which differentially affect the structures of the resulting systems. One way to examine the effects of such pressures in experimental lab settings is by studying the emergence of miniature artificial languages in communication game experiments. In one experiment, participants in groups of various sizes played a game where they had to communicate about very simple scenes, using only some letters on a keyboard and no real words from languages they know. Over communication rounds, the languages created by the groups to achieve this goal develop various types of systematic structure, while the participants in these experiments got better at getting the right meaning across. But are these languages also easier to learn from scratch? I will present my design, analysis plan and some preliminary results of an experiment using languages created in group experiments as input stimuli, testing how easy they are to learn for naive participants. Additionally, I try to relate these results back to the group communication games that the languages were created in, presenting some exploratory analyses on the emergence of different features over communication rounds. The results provide some interesting insights into the cultural evolution of human communicative systems and the processes underlying the emergence of structure.

Michael Chimento (MPI for Animal Behavior)

Cultural Selection for Efficient Behaviors

Culturally transmitted behaviors are hypothesized to be under selective pressure for local adaptive benefit to the organism. Two novel foraging puzzles (puzzle box task and string pulling task) were presented to experimental populations of *Parus major* in order to test how the presence of turnover and population size affect the strength of cultural selection. Two discreet solutions to the puzzle box differed in their efficiency, while the string pulling task had a continuous range of solution efficiencies. Populations were all seeded with the least efficient solution for the puzzle box, and no prior training was provided for the string pulling task. Preliminary results suggest that both turnover and population size contribute to stronger cultural selection for efficient solutions in both tasks. The experiment also offers insights as to what processes compose a cultural selection pressure.

Pooja Dongre (University of Lausanne)

Why do immigrant male vervet monkeys conform to local food preferences?

A social learning experiment with wild vervet monkeys found that newly immigrated males switched their food preferences to match those of their new groups. In other words, they conformed to new local 'norms'. Specifically, males were trained with their pre-dispersal groups to prefer corn coloured either blue or pink, by making the other taste bitter by soaking it with aloe. After immigrating into a group trained with the alternative colour preference, males' preferences were tested with their new groups, without the bitter taste added to either colour. When tested, males switched their preferences to match that which was being eaten by the majority of residents in their new groups. Here we present an extension of this experiment designed to test the ultimate function of the observed conformity. Specifically, we are testing whether immigrating males conform because they are uncertain about food quality in their new territory (informational conformity), or whether this phenomenon could have a social function, perhaps related to social integration (normative conformity). In this experiment, groups will again be trained to prefer either blue or pink corn before males disperse; and following dispersal, males' preferences will be tested in their new groups. In this experiment, training and testing will take place in specific locations where the territories of neighbouring groups, between which males disperse, overlap. This will allow us to test the hypothesis that males conform because of uncertainty about food quality in a new territory. If new immigrant males do not switch their preference in this overlapping territory, this suggests the males in the original experiment showed informational conformity. If, however, males continue to conform, despite having eaten their own preferred food in that exact location, the possibility of normative conformity arises, which could be related to social integration, group identity or other culturally relevant phenomena.

Ryutaro Uchiyama (London School of Economics and Political Science)

Understanding the coupled dynamics of neural plasticity and cumulative culture

Nervous systems are useful to organisms because their immense plasticity supports adaptive flexibility at rapid time scales compared to what is possible with genetic adaptation alone. Human cumulative culture has also been theorised to be an adaptive response to rapid environmental change, as it sets up a second (non-genetic) line of inheritance that can be reconfigured in response to environmental challenges in a much more flexible manner than genes can. The field of cultural evolution has often been ambiguous about the relationship between these two domains of adaptive fluidity, for example when it black-boxes the nervous system and treats it as an unstructured storage medium, or when cultural traits are modelled at a level of abstraction that requires no consideration of neurocognitive constraints. Here I present a theoretical framework as well as a simple model for understanding how neural plasticity and cumulative culture are expected to interact. One upshot of the analysis is that some portion of cumulative culture may be selected specifically to channel brain development into useful phenotypic states, rather than as a direct response to environmental conditions.

Sarah Eileen DeTroy (Leipzig Research Center for Early Child Development, University of Leipzig)

Chimp see, chimp do: The transmission of a novel skill in two groups of chimpanzees

Social learning is considered to be fundamental to the development of typical primate behaviors (Whiten & van de Waal 2018). Previous research has shown that novel behaviors are transmitted through social learning in captive and wild chimpanzee populations (Hobaiter et al. 2014) and that this process can be influenced by affiliation and kinship (Bonnie & de Waal 2006; Lonsdorf 2006). Social tolerance has been identified as a necessary prerequisite for social learning and differences in social tolerance levels have been proposed as an explanation for differences in socially learned behaviors among great apes (van Schaik 2003). In our study, we investigated the transmission of a novel skill in two groups of chimpanzees, and the effect of affiliation, kinship and social tolerance on this transmission. The two groups (Group 1: 24 individuals, Group 2: 48 individuals) live in a sanctuary and consist of multiple multi-generational family groups. We taught one mid-ranking female in each group how to operate a food-dispensing machine and subsequently ran 39 2-hour sessions over the course of 2 months in which the whole group had access to the machine. We assessed social tolerance with a group-feeding paradigm and affiliation as average proximity. A total of 14, untrained chimpanzees learned the novel skill across the two groups (4 in G1 and 10 in G2). Preliminary results revealed a strong correlation between the number of observations and skill acquisition (PPMC= 0.42, $p < 0.001$) as well as a significant difference in group-level social tolerance (Wilcoxon rank sum, $p=0.0037$). Future analyses will investigate the influence of interindividual relationships (as measured by proximity and kinship) on the likelihood of observing a socially learned behavior using multiple regression mantel tests (MRQAPs) and further explore the effect of differences in group-level social tolerance on social learning.

Stuart K. Watson (University of Zurich)

Chimpanzees demonstrate individual differences in social learning

Studies of transmission biases in social learning have greatly informed our understanding of how behaviour patterns may diffuse through animal populations, yet within-species inter-individual variation in social information use has received little attention and remains poorly understood. We have addressed this question by examining individual performances across multiple experiments with the same population of primates. We compiled a dataset spanning 16 social learning studies (26 experimental conditions) carried out at the same study site over a 12-year period, incorporating a total of 167 chimpanzees. We applied a binary scoring system to code each participant's performance in each study according to whether they demonstrated evidence of using social information from conspecifics to solve the experimental task or not (Social Information Score—'SIS'). Bayesian binomial mixed effects models were then used to estimate the extent to which individual differences influenced SIS, together with any effects of sex, rearing history, age, prior involvement in research and task type on SIS. An estimate of repeatability found that approximately half of the variance in SIS was accounted for by individual identity, indicating that individual differences play a critical role in the social learning behaviour of chimpanzees. According to the model that best fit the data, females were, depending on their rearing history, 15–24% more likely to use social information to solve experimental tasks than males. However, there was no strong evidence of an effect of age or research experience, and pedigree records indicated that SIS was not a strongly heritable trait. Our study offers a novel, transferable method for the study of individual differences in social learning.

Theo Toppe (Leipzig Research Center for Early Child Development, University of Leipzig)

How do micro-level contexts influence children's social inclusion of out-group members?

Children's intergroup behavior (e.g., social inclusion) may not only vary according to their cultural background, but also according to within-cultural differences such as socio-economic background, parental attitudes and socialization practices. This study examined such micro-level effects on preschoolers' social inclusion of out-group members into social interactions. Children's social inclusion behavior was assessed with an interactive paradigm. We analyzed to what extent they included an outgroup puppet into an ongoing ball-tossing game with another ingroup member. To assess micro-level effects, we tried to predict children's inclusion behavior with socio-economic measures, parental social dominance orientation, and a newly developed, exploratory questionnaire on ethnic socialization goals and practices. Data collection is still ongoing and so far, we collected data for 77 parent-child dyads. Results might give valuable insights into the impacts of children's social environment on their intergroup behavior and help to understand underlying mechanisms.