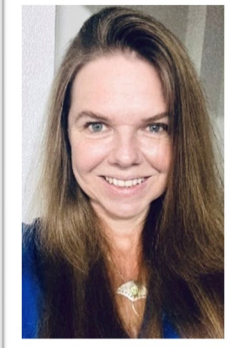
FRESH

5th Annual Conference

November 25-26, 2024 | Lausanne

Keynote: Andrea Migliano



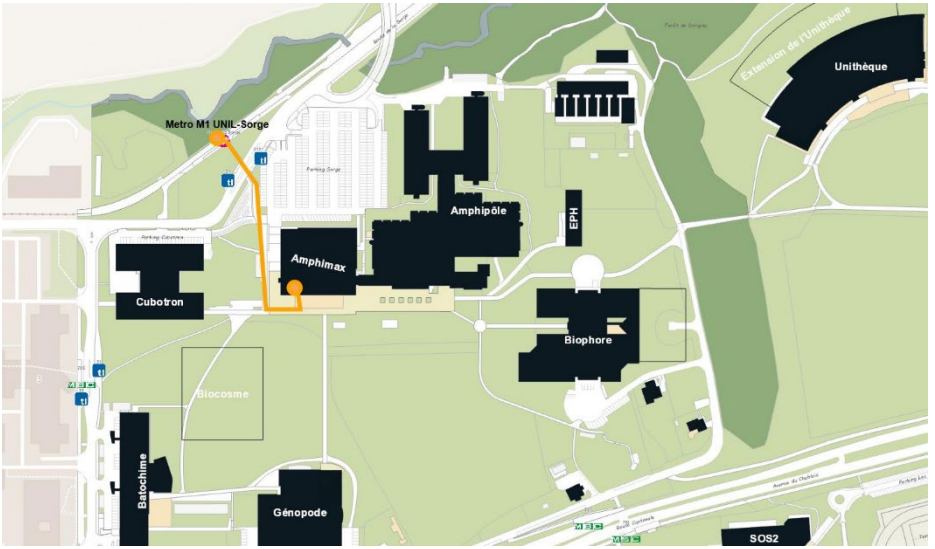
UNIL | Université de Lausanne

GENERAL INFORMATION

Address: Route de la Sorge 9, 1015 Lausanne
Building: Amphimax
Room: **MAX-414.**
Room for Keynote: MAX-415
Contact: fresh2024@sciencesconf.org
Web: fresh-cnrs.org

Organizing committee: Cedric Perret, Ludovic Maisonneuve, Maria Pykälä, Katelyn Bonner, Lukas von Flüe, Desirée Popelka, Blandine Ribotta, Laurent Lehmann,
with the invaluable help of the **FRESH steering committee**: Valentin Thouzeau, Alexandra Alvergne, Zachary Garfield, Katarzyna Pisanski and **UNIL administrative assistants:** Lena Kolecek and Christina Seld, and the generous **funding support** provided by the "Behavior, Economics and Evolution" program of UNIL.

Who is FRESH: The **FRench network for the Evolutionary Study of Humans (FRESH)** is a “Réseau Thématique Pluridisciplinaire” funded by the Institut écologie et environnement (INEE) of the CNRS. We are an interdisciplinary scientific community supporting researchers who use evolutionary and ecological approaches to study human activities. Most FRESH members are working in France or have strong links to France.



Directions: Exit at the M1 metro station, UNIL-Sorge. Cross the road, go straigth, take the stairs up, and you'll find the Amphimax building on your left.

Day 0 – SUNDAY, NOVEMBER 24, 2024

18.00 – 21.00	**Social Event for Pre-Conference Workshop Attendees**

Day 1 – MONDAY, NOVEMBER 25, 2024

09.00 – 10.15	**Pre-conference Workshop (1)**
10.15 – 10.45	Break
10.45 – 12.00	**Pre-conference Workshop (2)**
12.00 – 13.30	Lunch & Welcome
13.30 – 15.00	**Session 1 – Mate choice & Gender dynamics**
15.00 – 15.30	Break
15.30 – 17.00	**Session 2 – Cooperation & Reciprocity**
17.00 – 17.30	Break
17.30 – 18.30	**Keynote – Andrea Migliano**
18.30 – 20.00	Reception

Day 2 – TUESDAY, NOVEMBER 26, 2024

09.00 – 10.00	**Session 3 – Cultural evolution & Social learning**
10.00 – 10.30	Break
10.30 – 12.15	**Session 4 – Life history & Health**
12.15 – 13.45	Lunch
13.45 – 14.45	**Session 5 – Personality & Cognition**
14.45 – 15.00	Break
15.00 – 15.30	**FRESH General Assembly**
15.30	End of the conference

DAY 1 – MONDAY, NOVEMBER 25, 2024

09.00 – 10.15 and 10.45 – 12.00

Pre-conference workshop

Laurent Lehmann, University of Lausanne
Introductory class on modelling the evolution of decision-making mechanism and preferences for social interactions

13.30 – 15.00

Session 1 – Mate choice & Gender dynamics

Blandine Ribotta, EPFL
Associations between Occupational Homogamy and Career Success among 253 Well-Known French-Speaking Singers (15 min)

Désirée Popelka, EPFL
Outsourcing Love, Why Are OnlyFans and Virtual Girlfriend Applications So Successful? – An Evolutionary Psychology Perspective (5 min)

Victoire Martignac, University of Zurich
Where Do Female Mountain Gorillas Disperse To? (15 min)

Michel Raymond, ISEM
The Evolution of Homosexual Orientation in Humans and Third-Gender Societies (5 min)

Olympia Campbell, IAST
Skewed Sex Ratios and Violence Against Women in Pakistan (15 min)

15.30 – 17.00

Session 2 – Cooperation & Reciprocity

Jorge Peña, IAST
Reciprocity and the Evolution of Risk-Reduction Sharing (15 min)

Miguel dos Santos, University of Lausanne
Altruism and natural selection in a variable environment (5 min)

Grégory Fiorio, ENS Paris
When Innocents Are Fair Game: An Evolutionary Theory of Displaced Revenge (15 min)

Grégoire Darcy, ENS Paris
What's the property in intellectual property? Ideas can be shared, but not reputation (5 min)

Amine Sijilmassi, Sciences Po, Paris
Information About Immigrants' Deservingness Reduces Misperceptions and Opposition to Immigration (15 min)

Julien Lie-Panis, Max Planck Institute for Evolutionary Biology
Investing in Cooperation (5 min)

17.30 – 18.30 (in **room MAX-415**)

Keynote

Andrea Migliano, University of Zurich
Evolutionary Consequences of Human Multilevel Social Structure

DAY 2 – TUESDAY, NOVEMBER 26, 2024

09.00 – 10.00

Session 3 – Cultural evolution & social learning

Katelyn Bonner, University of Lausanne
The Strategy Space Problem in Gene-Culture Coevolution (5 min)

Ludovic Maisonneuve, University of Lausanne
How does stochasticity in learning impact the evolution of learning behaviors (15 min)

Deepshika Arun, University of Zurich
Navigating Overimitation: Unravelling the Impact of Education, Culture, and Age in the Agta Community (5 min)

Lukas von Flüe, University of Lausanne
Effects of heterogeneity in social learning on social norm change (5 min)

Maria Pykälä, University of Lausanne
Algorithm-augmented cumulative cultural evolution (5 min)

Ruth Mace, University College London
The Cultural Evolution of Witchcraft Beliefs (5 min)

10.30 – 12.15
Session 4 – Life history & Health

Adrian Jaeggi, Institute of Evolutionary Medicine, Zurich
Oxytocin Throughout the Life Course: A Sex-Specific Mediator of Life History? (5 min)

Mathilde Le Vu, Institute of Evolutionary Medicine, Zurich
In Utero Exposure to Maternal Influenza or Syphilis: Challenging the Brain Sparing Hypothesis (15 min)

Arnaud Tognetti, CNRS, INRAE Montpellier & Karolinska Institutet, Solna
The Behavioral Defense Against Disease: Humans Can Identify Early Cues of Sickness (15 min)

Valerie Bättig, Institute of Evolutionary Medicine, Zurich
Is PMS a Human Universal? Impact of Cycle Phase and Hormonal Fluctuations on PMS Symptoms in a Small-Scale Society (5 min)

Dominik Jud, Institute of Evolutionary Medicine, Zurich
The Influence of Different Stressors on the Diurnal Cortisol Rhythms in a Small-Scale Society (15 min)

13.45 – 14.45
Session 5 – Personality & cognition

Thomas Beuchot, ENS Paris
Why Does Personality Exist? The Self-Plasticity Theory (15 min)

Chirag Chittar, University of Zurich
A Metanalytical Cross-Cultural Analysis of Theory of Mind (5 min)

Camila Scaff, Institute of Evolutionary Medicine, Zurich
*Assessing Neurodiverse Traits in a Small-Scale Subsistence Society (*15 min)

Charlotte Debras, Institute of Evolutionary Medicine, Zurich
Beyond Familiar Bonds: Social Distance Elevates Oxytocin Levels in a Small-Scale Human Society (5 min)

15.00 – 15.30
FRESH General assembly

Pre-Conference WORKSHOP

Introductory class on modelling the evolution of decision-making mechanism and preferences for social interactions

Laurent Lehmann
University of Lausanne (Switzerland)

In the abstract of his seminal 1964 paper, Hamilton stated that "species following the model should tend to evolve behaviors such that each organism appears to be attempting to maximize its inclusive fitness." However, Hamilton did not prove this result, nor did he come close to doing so. Fortunately, the field of theoretical research inspired by Hamilton's work—now commonly referred to as social evolution theory—has advanced significantly in the past few decades. In this introductory modelling course, we will explore how modern formalizations of social evolution address Hamilton's claim and investigate what types of objectives species following standard evolutionary models will evolve to attempt to maximize behaviourally. Along the way, we will cover key concepts in social evolution theory, focusing on long-term evolution and adaptation.

SESSION 1 – Mate choice & Gender dynamics

Associations between Occupational Homogamy and Career Success among 253 Well-Known French-Speaking Singers

Blandine Ribotta, Bruno Lemaitre
EDDH, EPFL (Switzerland)

In competitive occupational fields, individual talent is often considered paramount for success. However, forming social bonds, particularly romantic relationships with influential individuals, may also play a crucial role in career advancement. In this study, we investigate the impact of engaging in romantic relationships with partners working in similar occupations (referred as 'occupation homogamy'), as well as with famous partners, on career success in the creative industry. The French music industry, known for its numerous high-profile creative couples, provides a compelling context for this exploration. We conducted a web-based analysis of biographical data from 253 prominent French-speaking singers born in the 20th century, examining the timing of their musical hits and the formation of romantic relationships. Data were sourced from Wikipedia, press articles, and the Infodisc database, which lists musical success records in France since 1900. We assessed sex differences in initial and sustained career success relative to the partner's occupation and fame. Our findings reveal

that forming a romantic relationship with a partner in a similar occupation is significantly associated with career success. Notably, a considerable proportion of singers, especially women, entered romantic relationships with similar occupational partners before their first hit, with a smaller yet significant fraction partnering with already famous individuals. This study suggests that beyond talent and passion, forming a creative collaborative couple can both promote and accompany a rise in the hierarchy, particularly in this competitive industry.

Outsourcing love, why are OnlyFans and Virtual Girlfriend applications so successful? – an evolutionary psychology perspective

Désirée Polpeka, Bruno Lemaitre
EPFL (Switzerland)

The "girlfriend experience" (GFE), where men pay for simulated romantic relationships, has a long history. Recently, OnlyFans (OF) adapted this concept to the virtual world, creating the OF GFE, where users pay content creators to act as virtual girlfriends through online chats, messaging, and more. This perspective paper examines the popularity of OF GFE and AI chatbots from an evolutionary psychology perspective, using theories related to mate selection and social bonding. We also pose several questions about how these types of platforms leverages fundamental evolutionary behaviors, numbing innate human needs for social connections in a modern, technology-driven context.

Where do female mountain gorillas disperse to?

Victoire Martignac (1), Winnie Eckar (1,2), Samedi Mucyo, Tara Stoinski (2), Veronica Vecellio (2), and Robin Morrison (1,2)
1 – Department of Evolutionary Anthropology, University of Zurich (France), 2 – The Dian Fossey Gorilla Fund International (US)

Dispersal between social groups is a fundamental aspect of many animal societies, impacting the transmission of genes, knowledge, and culture, but also individual fitness. However, our understanding of dispersal remains limited, and little is known about the information individuals use when dispersing between groups. Mountain gorillas have large-scale societies, in which individuals' social relationships extend beyond their current social group. They exhibit a flexible dispersal pattern, with approximately 50% of females and males dispersing from their natal groups, and females often dispersing multiple times across their lives. Using two decades of data from the Dian Fossey Gorilla Fund (2003-2023) including 154 dispersal events from 61 females across 15 social groups, we examined how social familiarity influenced females' dispersal. We modelled dispersing females's familiarity with nearby groups based on annual home-range overlap, intergroup encounters, and past co-residency with group members in their natal group or another previous group. Females avoided groups that contained males from their natal group, but preferred groups containing females they had previously resided with. Our findings suggest that females prioritize inbreeding avoidance and the maintenance of female relationships in their dispersal decisions. Joining a new group can be costly, with immigrant females often facing high rates of aggression and stress. Preexisting relationships

may therefore reduce these dispersal costs. In addition to highlighting the importance of female relationships in a species where these are generally assumed to be weak, our study lends insights into the influence of mountain gorillas' large-scale society on individuals' dispersal decisions.

The evolution of homosexual orientation in humans and third-gender societies

Michel Raymond
Institut des Sciences de l'Evolution, Université Montpellier (France)

How homosexual orientation evolved in humans is still an unsolved Darwinian paradox. Western societies, where most studies have been conducted, are not well suited to testing evolutionary hypotheses because they have low overall fertility (variations in fertility associated with different phenotypes are difficult to identify) and the widespread use of modern contraception alters genetic correlations with reproductive output. I will explain why societies with a third gender are more promising in this respect, and present some preliminary results from French Polynesia. Don't expect the paradox to be resolved during this 5-minute talk, I just hope to keep you awake ...

Skewed sex ratios and violence against women in Pakistan

Olympia Campbell
IAST – Institute for Advanced Study in Toulouse (France)

Concerns have been raised that an excess of men leads to societal violence, including violence against women, though recent evidence has challenged this view. One area that remains untested is honour killings, a type of femicide perpetrated by unrelated family members, such as intimate-partners, and related family members, such as parents and siblings. Using a novel dataset of media reports of honour killings from Pakistan we test whether the sex ratio is associated with femicide. To address reporting bias, we implement two case-control studies. The first compares media reports of honour killings to male suicides. The second compares honour killings perpetrated by unrelated individuals to those perpetrated by kin. We find evidence that honour killings perpetrated by unrelated individuals are higher in male-biased areas compared to those perpetrated by kin. Honour killings of women by kin therefore appear less sensitive to the sex ratio. Results align with sexual selection theory, suggesting more male competition may lead to more violence. We also find weak evidence that male biased areas report more male suicides than honour killings. However, we caution against drawing causal conclusions due to potential confounding variables, particularly economic deprivation. This research highlights the challenges of studying sensitive topics quantitatively.

SESSION 2 – Cooperation & Reciprocity

Reciprocity and the evolution of risk-reduction sharing

Alejandro Pérez Velilla (1), Georg Nöldeke (2) and Jorge Peña (3, 4)
1 – University of California (US), 2 – University of Basel (Switzerland), 3 – Toulouse School of Economics (France), 4 – Institute for Advanced Study in Toulouse (France)

Food sharing is a fundamental form of cooperation that is widespread in human societies. One of the main mechanisms proposed to explain the evolution of food sharing in humans is risk reduction when food acquisition is variable. Here, we expand a previous game-theoretic model by Smith and Boyd (1990) to show how reciprocity and voluntary participation allow for risk-reduction sharing to evolve. Our model considers a population of foragers with three different types (or strategies): sharers (who form and abide by sharing agreements with other partners), loners (who do not form sharing agreements with others and remain self-sufficient) and hoarders (cheaters who form sharing agreements but refuse to share). As long as interactions are repeated and sharers are able to exclude hoarders upon identifying them, there is a critical value of the continuation probability above which the only stable equilibrium of the model consists of a population of sharers. This result is general, and holds for a wide class of risk distributions, utility functions used to model risk aversion, and number of individuals in a group. We also analyze, for particular cases, the effects of risk, risk aversion, correlated outcomes, and group size on the critical continuation probability and hence on the evolution of sharing. Our model and results generalize and formalize previous attempts at modeling and making evolutionary sense of reciprocal risk-reducing sharing.

Altruism and natural selection in a variable environment

Miguel dos Santos (1), Philip A. Downing, Ashleigh S. Griffin, Charlie K. Cornwallis and Stuart A. West
1 – University of Lausanne (Switzerland)

Hamilton's rule provides the cornerstone for our understanding of the evolution of all forms of social behavior, from altruism to spite, across all organisms, from viruses to humans. In contrast to the standard prediction from Hamilton's rule, recent studies have suggested that altruistic helping can be favored even if it does not benefit relatives, as long as it decreases the environmentally induced variance of their reproductive success ("altruistic bet-hedging"). However, these predictions both rely on an approximation and focus on variance-reducing helping behaviors. We derived a version of Hamilton's rule that fully captures environmental variability. This shows that decreasing the variance in the absolute reproductive success of relatives does not have a consistent effect—it can either favor or disfavor the evolution of helping. We also show that costly helping can sometimes be favoured even if it increases the

variance in the reproductive success of relatives. Altogether, our results suggest that the effects of helping on the variability components of reproductive success do not play a consistent role in favoring helping.

When innocents are fair game: An evolutionary theory of displaced revenge

Grégory Fiorio (1) and Zachary Garfield (2)
1 – Institut Jean-Nicod, ENS Paris (France), 2 – Université Mohammed VI Polytechnique (Morocco)

Displaced revenge–the deliberate punishment of uninvolved third parties instead of the offender–-poses a puzzle for standard evolutionary theories of revenge and retribution. Why target uninvolved parties if the primary function of revenge is to teach offenders a lesson? How can it be morally acceptable to punish an innocent third party when the principle of responsibility typically determines what counts as just deserts? Existing social-psychological and economic theories fail to explain key features of displaced revenge. In particular, they do not account well for the frequent disregard for the responsibility of the targeted individual nor for the target selection documented in the ethnographic record. Building on the concept of fitness interdependence, we propose that displaced revenge serves as a deterrent signal by imposing indirect costs on offenders. This framework is consistent with ethnographic, comparative, and experimental evidence and generates novel predictions about target selection and the socio-ecological correlates of displaced revenge. Findings from preliminary analyses of cross-cultural secondary data suggest that this theory may also help to explain cultural variation in the propensity to target relatives of the offender. Ultimately, this framework highlights the relevance of evolutionary approaches to the study of apparently maladaptive or irrational behaviors.

What's the property in intellectual property? Ideas can be shared, but not reputation

Grégoire Darcy (1), Hugo Mercier (1), and Mia Karabegović (2)
1 – Institut Jean-Nicod, ENS Paris (France), 2 – Sciences Po, Paris (France)

Intellectual property (IP) law is intended to protect the ownership of ideas and drive innovation, yet high rates of non-compliance suggest a disconnect between legal frameworks and public moral intuitions. We hypothesize that this misalignment stems from reputational misattribution, where either undue recognition is given to the wrong individual or rightful credit is withheld from the creator, strongly influencing how people morally assess situations involving ideas ownership. In Study 1, we test a general model to examine whether reputation-through factors like gratitude, competence, and audience size-drives moral judgments in these contexts. In Study 2, we apply this model to specific IP scenarios, such as plagiarism, pseudonyms, ghostwriting, and AI-generated content, to evaluate whether reputational misallocation consistently shapes moral evaluations across diverse cases. Our findings are

expected to reveal Our findings are expected to reveal why certain IP frameworks align more closely with public moral values, and why in some situations people are harsher than the law, while in others they are more lenient.

Information about Immigrants' Deservingness Reduces Misperceptions and Opposition to Immigration

Amine Sijilmassi (1), Lou Safra (1), Hugo Mercier, and Coralie Chevallier (2)
1 – Sciences Po, CNRS (France), 2 – Institut d'études cognities, ENS Paris (France)

Anti-immigration attitudes remain widespread across Western societies, raising concerns for social cohesion. Using an evolutionary psychology framework, this study investigates whether correcting misperceptions about immigrants' deservingness–using cues like their intent to contribute and efforts to overcome socio-economic challenges–can counter antiimmigration prejudice. In Study 1 (N = 474), a factorial survey experiment showed that low-status immigrants were viewed more favorably when they exhibited deservingness traits. Studies 2a (N = 1,506) and 2b (N = 1,255), conducted as 1-week longitudinal studies during the 2024 European and French parliamentary elections, revealed that an information treatment emphasizing deservingness cues strongly reduced misperceptions about immigrants, modestly reduced opposition to immigration, and provided mixed evidence for a reduction in far-right voting. These findings suggest that while immigrants are often perceived negatively, emphasizing deservingness can mitigate prejudice, presenting a promising strategy for reducing anti-immigration bias.

Investing in cooperation

Julien Lie-Panis and Christian Hilbe
1 – Max Planck Institute for Evolutionary Biology (Germany)

In evolutionary game theory, cooperation is typically studied with exogenous costs; agents have no control over the costliness of their actions. However, in real-world contexts, individuals often engage in preparatory behaviors that can be viewed as "cooperation investments"—actions which are costly upfront but facilitate cooperation over time. Examples include reading a lab's papers before a visit, learning the language as a prospective immigrant, or converting to a partner's religion. These investments should increase the chances of future cooperative interactions by lowering the costs of collaboration and signaling cooperative intentions to others. We develop a mathematical model to examine the implications of cooperation investments. We show that allowing agents to invest broadens the domain of existence of cooperative equilibria, and that making these investments visible to others further expands the cooperative domain. To facilitate trust, investments must be sufficiently costly, so as to serve as honest signals of cooperativeness. To complement our static analysis, we conduct evolutionary simulations, which provide consistent results.

KEYNOTE

Evolutionary Consequences of Human Multilevel Social Structure

Andrea Migliano
University of Zurich

I will discuss my work over the past 15 years on the social structure of contemporary hunter-gatherers and how the human foraging niche has shaped patterns of mobility, cooperation, and cumulative cultural evolution. The human capacity for cumulative culture—a type of culture that cannot be recreated by a single individual and builds up over generations—has evolved over hundreds of thousands of years in our pre-Neolithic ancestors. Hunter-gatherers, who are rapidly disappearing, offer the best insight into a lifestyle that has shaped our unique evolutionary traits. Using social network analyses, quantification of medicinal plant knowledge, and population genetics data, I highlight how the multilevel sociality of hunter-gatherers has facilitated the evolution of cumulative culture and driven cultural differentiation between humans and chimpanzees.

SESSION 3 – Cultural evolution & Social learning

The Strategy Space Problem in Gene-Culture Coevolution

Katelyn Bonner, Charles Efferson
University of Lausanne (Switzerland)

Understanding how individuals learn socially is central to explaining aggregate-level cultural evolution. Prior research has shown that even small heterogeneities in individual social learning strategies can have outsized impacts on population-level cultural dynamics. Yet, most theoretical research has relied on assumptions that preclude the majority of possible strategies from ever arising in evolutionary models, potentially distorting our understanding of cultural evolution. This study aims to address this potential issue by comparing the evolutionary dynamics and stable strategies that emerge under two distinct modeling approaches. The first approach, Bayesian updating, imposes structured constraints on the social learning process, inherently limiting the strategy space. The second approach, using Finite State Machines, allows for an unrestricted exploration of all feasible strategies. By analyzing these frameworks, we aim to uncover how strategy space restrictions may bias our understanding of cultural evolution and to identify the broader implications of strategy diversity in shaping evolutionary outcomes.

How does stochasticity in learning impact the evolution of learning behaviors

Ludovic Maisonneuve, Laurent Lehmann
University of Lausanne (Switzerland)

Animals rely on information, referred to as knowledge (e.g., information about migration routes, food sources, or tool use), to enhance their survival and reproduction. To acquire knowledge, they invest effort in various forms of learning, which include producing knowledge independently through individual learning or acquiring it from parents or other adults via vertical or oblique learning. While numerous models have explored factors influencing the evolution of learning behaviors, many assume a deterministic learning process, and those incorporating stochastic learning generally do not address its impact on the evolution of learning behaviors. Here, we developed a mathematical model to explore how stochasticity in learning influences the evolution of time allocation among vertical, oblique, and individual learning. We find that stochasticity in learning increases the proportion of time allocated to vertical and oblique learning compared to individual learning. Greater stochasticity increases the likelihood that some individuals achieve very high knowledge by luck, making vertical and oblique learning advantageous as it enables learning from those high-knowledge individuals who are likely to be among survivors who can transmit their knowledge to the next generation. Moreover, we find that stochasticity in learning increases the proportion of time allocated to vertical compared to oblique learning when knowledge enhances fecundity without affecting survival, as vertical learning enables individuals to acquire knowledge from high-knowledge individuals who are more likely to be their parents due to their greater fecundity.

Navigating Overimitation: Unravelling the Impact of Education, Culture, and Age in the Agta Community

Deepshika Arun, Andrea Migliano, and Lucio Vinicius
University of Zurich (Switzerland)

Overimitation–the replication of irrelevant actions during observational learning–has significant implications for cultural practices and technological transmission. While prevalent in Western societies, cross-cultural research reveals variations in overimitation's developmental trajectory among hunter-gatherers. This study examined overimitation across age groups (5–60 years) and non-WEIRD populations, focusing on Agta hunter-gatherers in the Philippines, who are experiencing recent social changes and increased access to formal education. We assessed Agta children, adults, and non-Agta children using a reward retrieval task that included causally relevant and irrelevant actions. Results showed that a significant portion of Agta individuals across generations engaged in overimitation, paralleling Western populations. However, certain Agta children displayed lower fidelity in replicating irrelevant actions, with a preference for emulation until ages 5–7, challenging the "copy all, refine later" theory and suggesting overimitation in early childhood may not be universal. Our findings

revealed a positive correlation between age and copying fidelity, indicating a more nuanced default strategy in children. Additionally, formal education emerged as a significant factor, influencing overimitation levels and suggesting a co-evolution between overimitation and structured teaching practices, particularly in learning complex material culture. This study provides novel insights into how ontogeny, culture, and education interact to shape overimitation across diverse populations, underscoring the role of social and educational contexts in social learning practices.

Effects of heterogeneity in social learning on social norm change

Lukas von Flüe, Charles Efferson
University of Lausanne (Switzerland)

Individuals vary greatly in how they respond to information about the behaviour of others, which can significantly influence the effects of policy interventions aimed at changing social norms. Despite its significance, our understanding of this diversity in social learning and its implications for evolutionary dynamics is still in its early stages. This paper implements an agent-based model to investigate social norm change, setting itself apart by allowing agents to access and utilise a variety of information types. This approach enhances typical norm change models which assume that agents solely react to choice distributions. The dynamics of social norm change are modelled with a coordination game in which agents choose between two options, the status quo and an alternative. While coordination on the alternative behaviour would enhance social welfare, agents remain entrenched in a status quo norm equilibrium, which is suboptimal for each individual. The study evaluates various interventions aimed at catalysing endogenous shifts towards the alternative norm. By expanding traditional models to include multiple learning mechanisms, a wider array of interventions can be assessed. The effectiveness of these interventions depends crucially on accurately targeting specific groups of agents and carefully selecting the social information highlighted. This research underscores that diversity in social learning adds complexity to the dynamics of norm change, suggesting that achieving rapid norm change by targeting a critical mass of influential individuals may not always be possible.

Algorithm-augmented cumulative cultural evolution

Maria Pykälä
University of Lausanne (Switzerland)

Algorithms can generate novel cultural components and influence social transmission pathways, yet their short-term and long-term impact on cultural evolution is unknown. A key difference between humans and algorithms with regards to cultural evolution is the capacity of algorithms to search and combine vast amounts of information in novel ways. This model investigates the impact of random algorithm search on cumulative cultural evolution, and how social learning from algorithms can critically shape the resulting dynamics. Cumulative cultural evolution is modelled using small groups of social learner-agents (modelling humans) and algorithm-agents combining cultural components to generate and transmit innovations with

underlying path-dependent trajectories. The impact of empirically established learning biases, i.e. neutrality, aversion, and appreciation towards algorithm-generated solutions is investigated. Results show that a balance of individual exploration and learning from powerful algorithms can augment innovation. On the other hand, the innovation-rate of extensively searching, opaque algorithms can exceed the learning capacity of social learners and limit innovation. This model suggests that the scale of algorithm search, learning biases and the balance of exploration and exploitation can influence how algorithms shape cumulative cultural evolution.

The cultural evolution of witchcraft beliefs

Ruth Mace (1) and Sarah Peacey (2)
1 –University College, London (UK), 2 – Institute for Advanced Study in Toulouse (France)

Witchcraft beliefs are historically and geographically widespread, but little is known about the cultural inheritance processes that may explain their variation between populations. A core component of witchcraft belief is that certain people ('witches') are thought to harm others using supernatural means. Various traits, which we refer to as the 'witchcraft phenotype' accompany these beliefs. Some can be classified as 'symbolic culture', including ideas about the typical behaviour of witches and concepts such as familiars (witches' magical helpers), and demographic traits such as the age and sex of those likely to be accused. We conducted an exploratory study of the cultural evolution of 31 witchcraft traits to examine their inferred ancestry and associations with historic population movements. We coded a dataset from ethnographic accounts of Bantu and Bantoid-speaking societies in sub-Saharan Africa (N = 84) and analysed it using phylogenetic comparative methods (PCMs). Our results estimate that while some traits, such as an ordeal to test for witchcraft, have deep history, others, such as accusations of children, may have evolved more recently, or are limited to specific clusters of societies. Demographic and symbolic cultural traits do not typically co-evolve. Our findings suggest traits have different transmission patterns, and these may result from benefits they provide or from universal psychological mechanisms that produce their recurrent evolution.

SESSION 4 – Life history & Health

Oxytocin throughout the life course: a sex-specific mediator of life history?

Adrian Jaeggi (1), Abigail Colby (1), Charlotte Debras (1), Dominik Jud (1), Valerie Bättig (1), Jordan Martin (2), Camila Scaff (1, 3), Michael Gurven (4), and Benjamin Trumble (5)
1 – Institute of Evolutionary Medicine, University of Zurich (Switzerland), 2 – Eawag (Switzerland), 3 – ENS Paris (France), 4 – University of California (US), 5 – Arizona State University (US)

By examining endogenous oxytocin levels across the life course, we can learn more about the role of this hormone in human life history. Using radioimmunoassay, we measured urinary oxytocin in a cross-sectional sample (n=843 samples, n=351 individuals, age=2-84 years, 50.7% female) from the Tsimane of lowland Bolivia. We assessed age-related changes in oxytocin in females and males using GLMMs with an age spline. We found a strong nonlinear relationship between age and oxytocin in females (spline standard deviation (sds) = 2.62 (CI = 0.80-5.91)), with low levels in childhood, a sharp rise around puberty and peak during the reproductive years–consistent with oxytocin's role in birth and lactation–followed by a decline around menopause, resembling reproductive steroids across the female life course. In males, the relationship between age and oxytocin is also non-linear (sds = 0.49 (CI = 0.02-1.74)), with oxytocin lowest in adolescence and gradually rising throughout adulthood, reaching its highest levels in old age. Explanations for this post-adolescent rise in oxytocin include marriage and fatherhood – a pattern also observed in industrialized populations. Higher oxytocin in older men could reflect survivor bias, consistent with other findings that characterize oxytocin as a "youth" hormone. Alternatively, this pattern could result from age-related behavioral or physiological changes, such as older men spending more time at home with family and being regarded as cultural experts and teachers, or physiological dysregulation. More work investigating oxytocin in the context of age- and sex-specific behavior and physiology is needed.

In utero exposure to maternal influenza or syphilis: challenging the brain sparing hypothesis

Mathilde Le Vu (1), Mario Cortina-Borja (2), and Jonathan C.K. Wells (2)
1 – Institute of Evolutionary Medicine, University of Zurich (Switzerland), 2 – Institute of Child Health, London (UK)

The foetal brain sparing hypothesis states that brain size is preserved at the expense of other tissues in the context of a poor intrauterine environment. According to this hypothesis, we expect that infants exposed to infectious diseases in utero have a similar head circumference but a lower birth weight, compared to unexposed infants. We use archival data from a maternity hospital in Switzerland to challenge this hypothesis, and focus on 8'000 singletons

born alive at the beginning of the 20th century in the city of Lausanne. Among 300 pregnant women with the flu during the 1918-20 influenza pandemic and 100 with syphilis between 1911 and 1922, we find that both infections are associated with significantly lower birth weight and head circumference, compared to uninfected women. While maternal flu infection seems to similarly affect the two anthropometric measures, we find that head circumference pays a higher burden than birth weight in the case of syphilis. Thus, looking at livebirths only, our results do not support the brain sparing hypothesis. This suggests that in a large historical population, maternal infections may not selectively preserve brain size at the expense of other tissues, and prompts a reassessment of the hypothesis across various populations and time periods.

The behavioral defense against disease: Humans can identify early cues of sickness

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Although social life brings clear benefits, sociality facilitates the transmission of infectious pathogens. Many social species identify sick conspecifics through their body odors and subsequently avoid physical contact with them. Humans are likewise able to identify sick individuals based on overt cues of sickness, such as vomiting, coughing, sneezing or rashes, and the perception of these cues can also induce emotional disgust and subsequent avoidance. However, these sickness cues are expressed when people are already in an advanced disease stage and have likely been contagious for some time. Identifying sickness in its early stages could prove more effective in reducing the risk of contamination. This talk presents a series of studies indicating that sickness can be identified through cues from different sensory modalities only a couple of hours after an experimentally induced systemic inflammation, offering a potential behavioral avoidance mechanism to limit the spread of contagious diseases.

Is PMS a human universal? Impact of cycle phase and hormonal fluctuations on PMS symptoms in a small-scale society

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Premenstrual syndrome (PMS) is estimated to affect 20-30% of menstruating people with some studies suggesting that up to 80% experience symptoms at one point in their lives. PMS is characterized by a constellation of somatic and affective symptoms that manifest during the late luteal phase of the menstrual cycle and resolve shortly after the onset of menstruation.

The ”hormonal withdrawal hypothesis” suggests that the rapid drop in progesterone (P) and estradiol (E) levels during the late luteal phase may be responsible for the symptoms associated with PMS. Most extant menstrual cycle and PMS research is concentrated on WEIRD populations, whose steroid hormone levels differ significantly from nonindustrial populations. To address this research bias, we examine PMS symptoms and steroid hormone fluctuations among Tsimane women, a natural fertility population of forager-horticulturalists residing in the Bolivian lowlands. Using repeated measures of morning urine and a PMS symptom questionnaire (derived from the DSM-V), we characterized E, P, and PMS symptom fluctuation of 10 cycling Tsimane women (n=134 urine samples) across one cycle. Total urinary P and E were quantified with ELISA. Utilizing Bayesian multilevel models, we aim to evaluate 1) whether symptoms increase in the late luteal phase, and 2) whether rapid decline in E and/or P is associated with increased PMS symptom presence. Our research seeks to expand the understanding of health and well-being of Indigenous women. Moreover, we want to explore the possibility of a universal component of PMS.

The influence of different stressors on the diurnal cortisol rhythms in a small-scale society

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Dysregulations of the human stress response, namely the hypothalamic-pituitary adrenal (HPA) axis, have been linked to adverse health outcomes such as obesity and diabetes. These dysregulations manifest in a disrupted diurnal cortisol rhythm and are caused by both real and perceived chronic stressors. While research on the HPA axis is growing, most studies focus on high-income countries with similar and modern stressors, as opposed to populations experiencing more traditional lifestyles to which the stress response should be better adapted. The Tsimane of Bolivia are a horticulturalist society who face various stressors such as low caloric intake, parasitic infections and the challenge of market integration. Here, we measured urinary cortisol several times a day to get both the levels at waking as well as the diurnal slope (n=291). To assess the perception of stressors, a questionnaire on food insecurity and social as well as socioeconomic problems was conducted with adults from three different communities (n=125, f=77). By applying multilevel Bayesian multivariate models the correlation between stress scores and hormone measurements was assessed. Results show that socioeconomic problems correlate with a blunted cortisol rhythm (median $r_{intercept} = -0.05, P_{<0} = 0.64$), (median $r_{slope} = 0.12, P_{>0} = 0.72$) while social stress and general food insecurity correlate with higher morning levels (median $r_{intercept} = 0.08, P_{>0} = 0.73$),) and a steeper decline (median $r_{slope} = -0.19, P_{<0} = 0.83$). These results align with previous studies showing that the controllability of stressors affects the influence on the HPA axis, with uncontrollable stressors resulting in blunted curves as observed in people suffering from unemployment or depression.

SESSION 5 – Personality & Cognition

Why does personality exist? The self-plasticity theory

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Understanding the origins of psychological variation has long been a central goal in psychology. Numerous studies in evolutionary personality psychology have argued that personality results from fluctuating environmental pressures selecting for different optimal strategies and corresponding genes (balancing selection). However, over the past decade, mounting evidence from genomics studies shows that most personality variation is accounted for by deleterious mutations that selection and drift cannot remove quickly enough (mutation-selection-drift). According to some genomics researchers, this should mark the end of adaptive thinking on personality variation. In our paper, we argue that personality variation can best be explained by both mutation-selection-drift and adaptive plasticity. We demonstrate that most deleterious mutations affect personality indirectly and that, in most cases, personality is a plastic response to one's phenotype, a process we term self-plasticity. We integrate this proposal into a general theory to explain personality variation: most psychological variation is a plastic response to deleterious mutations, environmental conditions, and random developmental processes.

A metanalytical cross-cultural analysis of Theory of Mind

Chirag Chittar (1), Gina Menn (1), Lea Karrer (1), Sadegh Mustafavi, Jamaica Donato, John Donato, John Carlo D. Pallermo, Meike Günter (1), Lal Bahadur Khatri, Durga Khatri, Eustache Amboulou, Dieudrice Nganga, Judith Burkart (1), Nikhil Chaudhary (2, 3), Lucio Vinicius (1), and Andrea Migliano (1)
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Theory of Mind (ToM) refers to the universal capacity to comprehend the beliefs, knowledge, and emotions of conspecifics. The comprehension of ToM may represent a significant step in accessing the mental states of others, thereby facilitating socio-cognitive mechanisms of information transfer. ToM is frequently evaluated through the administration of false belief tests, such as the Sally-Anne test. Previous studies have proposed that there is a universal consistency in the developmental timing of ToM. However, the test designs implemented across diverse communities have yielded inconsistent results, which contradict the hypothesis that the developmental timing is consistent. Furthermore, false belief studies

have largely overlooked the influence of diverse social systems and subsistence strategies. This study represents the first attempt to conduct a series of variations on the Sally-Anne test on three distinct hunter-gatherer groups and three different farmer groups from three different countries (The Philippines, Congo-Brazzaville, and Nepal) with varying subsistence strategies. Furthermore, the objective of our study is to ascertain whether ToM is a universal socio-cognitive trait with a consistent developmental timing across different groups or whether it is triggered by socio-ecological pressures that cause acceleration or deceleration in its development. In the context of this study, access to schooling was considered as a socio-ecological pressure. However, the findings indicated that schooling had a significant impact on test performance. In addition, the results demonstrated that false belief test passing increased with age, and notably, non-hunter-gatherer adolescents exhibited a marginally significant level of test passing compared to hunter-gatherer adolescents and children.

Assessing Neurodiverse Traits in a Small-Scale Subsistence Society

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Are psychiatric conditions linked to WEIRD (Western, Educated, Industrialized, Rich, and Democratic) lifestyles, akin to other ”diseases of civilization” or have they always been present? To begin exploring this complex question requires examining how psychiatric symptoms manifest in communities living in radically different cultures and environments–such as small-scale subsistence societies. Despite the importance of such cross-cultural research, studies of psychiatric conditions remain limited and are virtually non-existent in small-scale societies. Currently, no suitable instrument exists for quantifying traits associated with psychiatric conditions in small-scale societies, as available questionnaires and tools are heavily tailored to WEIRD contexts and may fail to capture the culturally specific ways these traits manifest outside WEIRD societies. Here, we propose a multi-stage process to qualitatively and quantitatively assess these traits within the Tsimane', an indigenous small-scale subsistence community in Bolivia. We outline the steps and the extensive ethnographic effort involved in creating a culturally sensitive questionnaire to capture a range of personality and behavioral traits among Tsimane adults. Emphasizing the importance of ethnographic research, community involvement, and the use of local languages, our approach aims to establish a comprehensive, reproducible framework for measuring neurodiverse traits in small-scale subsistence societies and other non-WEIRD groups. By doing so, we hope to better understand how different social and ecological contexts may shape the expression of mental health-related traits, shedding light on the broader interplay between culture, society, and psychiatry.

Beyond Familiar Bonds: Social Distance Elevates Oxytocin Levels in a Small-Scale Human Society

Charlotte Debras (1), Adrian Jaeggi (1), Camila Scaff (1, 2), Abigail Colby (1), Jordan Martin (1, 3), Valerie Baettig (1), and Dominik Jud (1)

1 – Institute of Evolutionary Medecine, University of Zurich (Switzerland), 2 – ENS Paris (France), 3 – Eawag (Switzerland)

A growing body of research links the neurohormone oxytocin (OT) to human social behaviour, highlighting its ability to foster both prosocial and antisocial behaviour–also known as the 'oxytocin paradox'. From an evolutionary perspective, this paradox suggests that OT has evolved to regulate both cooperation and competition in social relationships. Since social investment involves balancing risks and competing interests, we hypothesise that OT may encode and modulate the perceived value of partners, with levels rising as familiarity decreases, signalling a need for heightened evaluation and caution in less familiar contexts. To test this, we collected 500 samples from 110 women (mean age = 35.13, SD=14.78) and 73 men (mean age=40.30, SD=18.69) over two field seasons in the Tsimane of Bolivia, a small-scale subsistence society experiencing daily cooperation and competition within small communities. Endogenous OT concentrations were measured with radioimmunoassays, and samples were classified into three contexts: C1 (asocial), C2 (with close relatives), and C3 (with less familiar people or strangers). Using Bayesian mixed-effects models and accounting for age, sex, and individual ID, we found that OT concentrations were higher during interactions with close relatives (mean C2 levels = -1.03) than when participants were experiencing an asocial context (mean C1 levels = -1.13, probability C2 > C1 = 0.77), and even higher when participants were involved in interactions with less familiar people (mean C3 levels = -0.74, probability C3 > C1 =0.998). These findings suggest that OT response differs depending on partner familiarity, supporting its role in regulating social interactions.

Day 1 – MONDAY, NOVEMBER 25, 2024

09.00 – 10.15	**Pre-conference Workshop (1)**
10.15 – 10.45	Break
10.45 – 12.00	**Pre-conference Workshop (2)**
12.00 – 13.30	Lunch & Welcome
13.30 – 15.00	**Session 1 – Mate choice & Gender dynamics**
15.00 – 15.30	Break
15.30 – 17.00	**Session 2 – Cooperation & Reciprocity**
17.00 – 17.30	Break
17.30 – 18.30	**Keynote – Andrea Migliano**
18.30 – 20.00	Reception

Day 2 – TUESDAY, NOVEMBER 26, 2024

09.00 – 10.00	**Session 3 – Cultural evolution & Social learning**
10.00 – 10.30	Break
10.30 – 12.15	**Session 4 – Life history & Health**
12.15 – 13.45	Lunch
13.45 – 14.45	**Session 5 – Personality & Cognition**
14.45 – 15.00	Break
15.00 – 15.30	**FRESH General Assembly**
15.30	End of the conference