

# **HUMAN BEHAVIOR & EVOLUTION SOCIETY**

## **32nd ANNUAL MEETING**



# Welcome to HBES 2021!

As the host and program committees for the 32nd annual meeting of Human Behavior and Evolution Society, we are pleased to welcome you to the #VirtuallyEverywhere online conference on Ohyay! The committees tried their best to accommodate a diversity and range of topics, speakers, and time zones this year. Below, we'll provide a brief overview of what to expect:

The conference program has many of the main events you would experience at an in-person conference. You'll see welcome remarks, special lunches scheduled, parties and other events to celebrate our HBES members, and so on. Most of these events will take place in Ohyay, while some will happen via Zoom (where indicated on the conference schedule). We hope the welcome video we made (located in the conference main lobby) will provide you the tools you need to navigate our conference space in Ohyay, but there is also a help desk available to you within Ohyay and you can also reach out to us should questions remain unresolved (see Important Information section). We also have a guest book room in Ohyay where you can leave comments for us. We hope you have a great conference experience and we look forward to seeing you in between sessions in one of our many social rooms in our Ohyay space! Lastly a big shout-out to all those who volunteered their time to make HBES' first online conference happen, particularly Lauren Velez at Ohyay and the fantastic volunteers who will help us moderate the conference sessions.

## Conference Contacts

Members of the Host and Program Committees will be available throughout the conference if you have any questions or concerns.

Questions/concerns related to registrations should be directed to [Nicole Barbaro](#)

Questions/concerns related to posters should be directed to [Coren Apicella](#)

Questions/concerns related to talks should be directed to [Chris von Rueden](#)

For concerns related to the HBES Code of Conduct and to report any violations of the code of conduct, contact the [HBES Grievance Committee](#).

# Acknowledgements

Host Committee: Coren Apicella, Nicole Barbaro, Chris von Rueden

Program Committee: Cari Goetz, Jaimie Krems, Aaron Lukaszewski, Anne Pisor

Poster Award Committee: Louis Alvarado, Gary Brase, Tania Reynolds

New Investigator Award Committee: Katherine McAuliffe, Michael Barlev, Kristopher Smith

Post-Doctoral Research Award Committee: Adrian Jaeggi, Sarah Mathew, Tess Robertson

Student Mentor Lunch Organizers: Cari Pick + Summer Mengelkoch

Women in the Evolutionary Behavioral Sciences Networking Mixer Organizer: Kristin Snopkowski

LGBTQ+ & Friends Networking Event Organizer: Michael Barlev

Grievance Committee: Martin Daly, Jaimie Krems, Bobbi Low, Karthik Panchanathan, Cari Pick, Catherine Salmon, & David Schmitt

HBES support: Leda Cosmides (Acting President)

Volunteers: Toe Aung, Atekeh Ebrahimi, Sven Kasser, Maria Clara Laporte, Angélica Oliveira, Saeed Rezvani Nejad, Jonathan Pereira, Phiética Rodrigues, Natália Tasso, Catharina Walldén

Ohyay support: Lauren Velez and other Ohyay engineers

## **HBES Officers**

President: Leda Cosmides

Past President: Doug Kenrick

President Elect: David Schmitt

Treasurer: Catherine Salmon

Secretary/Archivist: Todd Shackelford

Communications Officer: Nicole Barbaro

Student Representative: Cari Pick

Council Members-at Large: Coren Apicella, Pat Barclay, Bernhard Fink, Maryanne Fisher, David Puts, Chris von Rueden

## **HBES Meetings + Affiliated Events**

All links for open meetings will be available in ohyay.

Executive Council Meeting (closed): Tuesday, June 22<sup>nd</sup> 1pm EDT (via Zoom)

Publication Committee Meeting (closed): Tuesday, June 22<sup>nd</sup> 5pm EDT (via Zoom)

Business Meeting (open to all): Saturday June 26, 10:30am - 12pm EDT (via Zoom; Contact: Dave Schmitt)

Student Mentorship Lunch: Friday June 25th, 10:30am-12pm EDT (Contact: Cari Pick)

Women in the Evolutionary Behavior Sciences Networking Mixer: Friday June 25th, 4:30pm-6pm EDT (via Zoom; Contact: Kristin Snopkowski)

LGBTQ+ & Friends Networking Event: Saturday June 26th, 4:30pm-6pm EDT (via Zoom, Contact: Michael Barlev)

## **HBES Code of Conduct**

Attendees at HBES events must agree to the following as a condition of registration:

- Treat all participants, HBES staff, and vendors with courtesy and consideration.
- Be respectful and collaborative, critiquing ideas rather than individuals.
- Abuse, intimidation, discrimination, and sexual harassment are unacceptable. Sexual advances, requests for sexual favors, or sexually directed remarks constitute sexual harassment when such conduct (1) persists despite rejection, (2) is grossly inappropriate, or (3) is made to a subordinate who might reasonably fear that their position would be jeopardized if those advances were rejected. More information on what constitutes sexual harassment can be found in the full policy description:  
<https://tinyurl.com/HBESCO>
- Be mindful of your surroundings and of your fellow participants, and alert a member of the HBES grievance committee if you need assistance or notice a dangerous situation or someone in distress. The current members of the grievance committee are: Bobbi Low, Martin Daly, Catherine Salmon, David Schmitt, Cari Pick Jaimie Krems, and Karthik Panchanathan. You may also contact the grievance committee through the main HBES website (<https://www.hbes.com/grievance/>). The grievance committee may offer advice and may attempt to mediate disputes, and will report formal complaints to the Executive Council. The Council may, at its discretion, issue warnings, ask violators to leave the HBES meeting, or, for serious or repeated violations, revoke membership in the society. The investigative procedure is described in the full policy description:  
<https://tinyurl.com/HBESCO>
- Respect the rules and policies of ohyay, Zoom, OSF, and any HBES-contracted services.

Please see the full statement of the HBES Code of Conduct and related policies at:  
<https://www.hbes.com/conference>

## HBES 2021 Store!

Visit the HBES 2021 store for swag, like supersoft tees, sweatshirts, mugs, and kids' clothes! All proceeds go to HBES for supporting membership.

### HBES 2021 Conference Apparel (Large Logo)



Premium Unisex Tee

\$21.99



Crewneck Sweatshirt

\$31.99



V-Neck Unisex Tee

\$22.99



### HBES 2021 Conference Apparel (Small Logo)



# Schedule (all times EDT)

Thursday, June 24th

12pm-1pm	Conference Welcome, remarks from HBES President and Conference organizers, Awards, Introduction to ohyay ohyay room: <i>The Main Stage</i>		
1pm-1:10pm	Break		
Session 1	<b>Social Networks, Social Support, and Kinship</b> ohyay room: <i>The Mountain Room</i>	<b>Law, Justice, and Morality</b> ohyay room: <i>The Beach Room</i>	<b>Coalitional Psychology</b> ohyay room: <i>The Amphitheater</i>
1:10pm-1:30pm	Testing the buffering hypothesis: breastfeeding problems, cessation and social support in the UK	The origins of criminal law	Intergroup Conflict and Preferences for Dominant Leaders: Testing Universal Features of Human Followership Psychology across 25 Countries
1:30pm-1:50pm	Do post-marital residence patterns affect women's ability to mobilize social support?	Moral Molecules: Morality as a combinatorial system	A Sufficiency Test of the Alliance Hypothesis of Race
1:50pm-2:10pm	Cooperative networks are structured by religious affiliation in Vanuatu	Stereotypes of criminality track ecology, not race	Competition and inter-group relationships in human cooperation: a case study in a historic Italian city
2:10pm-2:30pm	Market Integration and Transitions in Fertility, Marriage, and Kinship Systems	Injustice, inequality, grievance, and homicide	Microaggressions as a Form of Low-Cost Intergroup Bargaining: Experimental Evidence <b>TALK CANCELED</b>
2:30pm-2:40pm	Break		
Session 2	<b>New Investigator Competition</b> ohyay room: <i>The Main Stage</i>		
2:40pm-3:00pm	Zachary Garfield, "Universal and variable leadership dimensions across human societies"		
Authors	Zachary H. Garfield, Kristen L. Syme, and Edward H. Hagen		
3:00pm-3:20pm	Manvir Singh, "Small gods, rituals, and cooperation: The Mentawai water spirit Sikameinan"		
3:20pm-3:40pm	Nicole Walasek, "What is the shape of plasticity in a fluctuating environment? An evolutionary model of incremental development"		
3:40pm-4pm	Kenji Itao, "Evolution of kinship structures driven by marriage tie and competition"		
4pm on	<b>Social Hour</b>		

Friday, June 25th

10:30am-11:45am	Student Mentorship Lunch (via Zoom)		
12pm-1pm	Plenary: Annie Wertz, introduction by Leda Cosmides "HOW PLANTS SHAPE THE MIND" ohyay room: <i>The Main Stage</i>		
1pm-1:10pm	Break		
Session 3	<b>Social Development- a comparative approach</b> ohyay room: <i>The Mountain Room</i>	<b>Cultural Norms in Small-Scale Ecologies</b> ohyay room: <i>The Beach Room</i>	<b>Sexuality</b> ohyay room: <i>The Amphitheater</i>
1:10pm-1:30pm	Toddlers, tools, and tech: The cognitive ontogenesis of innovation		
1:30pm-1:50pm	Early social development in wild capuchin monkeys <i>Sapajus libidinosus</i> and <i>S. xanthosternos</i>	How are norms maintained and how do they change? A Case Study of Cooperative farming division rules in Derung villages, Yunnan, China	The relationship between women's menstrual cycle characteristics and sexual motivation
1:50pm-2:10pm	The ontogenetic aspects of using social information in dogs	The Evolution of Body Adornment: Tattoos and Scarification in Hunter-Gatherer Societies	Hormonal Contraception and Sexuality: Causal Effects, Unobserved Selection, or Reverse Causality?
2:10pm-2:30pm	Characterizing spontaneous rescue behavior towards their owners in domestic dogs	He for she? Variation and exaggeration in men's support for women's empowerment in northern Tanzania	Variation in sociosexuality along sexual orientation continuum: A multi-study from Brazil, Chile, Czechia, and Portugal
2:30pm-3:30pm	<b>Poster Session</b> Posters will be available to view in ohyay throughout the conference and presenters will be available in poster rooms during the poster session		<b>Poster Finalist Flash Talks</b> ohyay room: <i>The Lightning Room</i>
3:30pm- 4:30pm			
4:30pm-6pm	Women in Evolutionary Behavioral Sciences (formerly Women of HBES) Networking Mixer (via Zoom)		

Saturday, June 26<sup>th</sup>

10:30am-11:45am	<b>Business Meeting</b> (open, via Zoom)		
12pm-1pm	<b>Plenary: Michael Bang Petersen, introduction by Rose McDermott "THE DESTRUCTIVE SIDE OF STATUS-SEEKING: HOW STATUS-SEEKING DRIVES EXTREME POLITICAL DISCONTENT WHEN ALONE, IN GROUPS, IN THE STREETS AND ON THE INTERNET"</b> ohyay room: <i>The Main Stage</i>		
1pm-1:10pm	Break		
Session 4	<b>Voice pitch as a signal of individual differences in humans</b> ohyay room: <i>The Mountain Room</i>	<b>Cooperation &amp; Morality</b> ohyay room: <i>The Beach Room</i>	<b>Mothers and Fathers: Evolution and Human Parental Investment</b> ohyay room: <i>The Amphitheater</i>
1:10pm-1:30pm	Who's afraid of Thanos? Sexual selection, honest signaling, and low voice pitch in men	Moral disciplining: the cognitive and evolutionary foundations of puritanical morality	Infant mortality is influenced by breastfeeding and male acknowledgment of paternity among U.S. infants
1:30pm-1:50pm	Vocal body size exaggeration in humans: from strategy to efficacy	Modular Morals: The Genetic Architecture of Morality as Cooperation	Infant care and microbiomes
1:50pm-2:10pm	The role of voice pitch in perceived and actual infidelity	The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe	The Cuckoldry Conundrum
2:10pm-2:30pm	How voice pitch is related to sociosexuality, dominance, and extraversion	Common Knowledge Promotes Cooperation in the Threshold Public Goods Game by Reducing Uncertainty	Are fathers a good substitute for mothers? Paternal care and growth rates in Shodagor children
2:30pm-2:40pm	Break		
Session 5	<b>Aggressive Bargaining &amp; Competition</b> ohyay room: <i>The Mountain Room</i>	<b>Challenging Some Big Assumptions</b> ohyay room: <i>The Beach Room</i>	<b>From Chaos to Clarity in Life History Theory: New Data and New Directions</b> ohyay room: <i>The Amphitheater</i>
2:40pm-3:00pm	Testing the etiology of mean sex differences in aggression using a genetic factor model	Computational services and encephalization in Homo	The development of life history strategies: Open questions and new directions
3:00pm-3:20pm	Reversing the gender gap: Women prefer a greater number of competitions than men	Why evolutionary psychology should abandon modularity, part II: The alternative framework	Can ecologically-relevant stimuli improve cognitive performance for children living in adversity?
3:20pm-3:40pm	Intersexual and intrasexual selection for neck musculature in men: Attractiveness, dominance, and actual fighting success.	Sexual Violence Against Women: The Most Widespread Human Rights Violation in the World	The Role of Childhood Unpredictability in Adult Health: A Life History Approach
3:40pm-4pm	The Face of a Leader: Combining behavioral experiments with geometric morphometrics	On hits and being hit on: error management theory, signal detection theory, and the male sexual overperception bias	Life History in Psychology Literature: Making sense of many conceptualizations and operationalizations
4:30pm-6pm	<b>LGBTQ+ &amp; Friends Networking Event (via Zoom)</b>		

Monday, June 28th

6pm-7pm	<b>Plenary: Magdalena Hurtado, introduction by Sarah Hrdy, "THE HUMAN COLONY: ORIGINS &amp; FUNCTION"</b> ohyay room: <i>The Main Stage</i>		
7pm-7:10pm	Break		
Session 6	<b>Choosing Cooperative Partners</b> ohyay room: <i>The Mountain Room</i>	<b>Inaccurate Beliefs: Origins and Consequences</b> ohyay room: <i>The Beach Room</i>	<b>The Adaptive Nature of Bullying</b> ohyay room: <i>The Amphitheater</i>
7:10pm-7:30pm	Reciprocity is calibrated by real-world priors, even in the lab: People reciprocate more and punish less when they believe people in their real-life social environment can easily switch partners	The mind's meta-data: Cognitive adaptations for monitoring the source of misleading communication	Adaptive Developmental Links Between the Dark Triad and Bullying
7:30pm-7:50pm	Honest signaling of cooperative intentions	Fear of contamination and public opinion on nuclear energy	Long-term Personality, Social, and Behavioral Trade-Offs of Childhood Bullying Perpetration
7:50pm-8:10pm	Tracking opportunities to develop cooperative relationships with needy others	Happy Thoughts: The Role of Communion in Accepting and Sharing Epistemically Suspect Beliefs	Mating, Parental, and Somatic Investment of Adults Who Bullied as Adolescents
8:10pm-8:30pm	Chimpanzees seek help, but not strategically	Ignorant armies clash by night: Massive scale mismatch, unseen nonlocal consequence multiplicity, and the universal failure to understand the consequences of our own politics	The role of social comparison and envy in motivating women's intrasexual aggression
8:30pm-8:40pm	Break		
Session 7	<b>Pathogens &amp; Threat Perception</b> ohyay room: <i>The Mountain Room</i>	<b>Evolutionary Perspectives on Friendship Preferences, Formation, and Maintenance</b> ohyay room: <i>The Beach Room</i>	<b>Personality &amp; Individual Differences</b> ohyay room: <i>The Amphitheater</i>
8:40pm-9:00pm	Pathogen disgust sensitivity protects against infection and is calibrated to local socio-ecological conditions in a high pathogen environment	Target-specific friend preferences: When we want kind, trustworthy, but also vicious friends	Sex differences in fearful personality traits: explained by facultative calibration to physical strength?
9:00pm-9:20pm	Pandemic psychology is not simply pathogen-avoidance psychology	What traits make a desirable friend?	Priming and personality predictors of social reasoning performance
9:20pm-9:40pm	Relational Mobility Predicts a Faster Spread of COVID-19: A 39-country Study	More than shared attitudes: A challenge to traditional theorizing about social bonding	Niche Diversity and Personality Structure
9:40pm-10pm	The effect of fearful facial expressions in ultimatum bargaining	Sex differences in competition: Distinguishing versus extinguishing friendships	An actuarially sound measure of mortality risk predicts human behavioral variation

Tuesday, June 29<sup>th</sup>

6pm-7pm	<b>Plenary: Melissa Wilson, introduction by Randy Nesse, "SEX-BIASED GENOME EVOLUTION"</b> ohyay room: <i>The Main Stage</i>		
7pm-7:10pm	Break		
Session 8	<b>Romantic Attraction</b> ohyay room: <i>The Mountain Room</i>	<b>Partner choice, social networks, and status in small-scale societies</b> ohyay room: <i>The Beach Room</i>	<b>Evolution of Economic Preferences</b> ohyay room: <i>The Amphitheater</i>
7:10pm-7:30pm	Modelling the effects of gender inequity and income inequality on mating markets	Coalitions and conflict: A longitudinal analysis of men's politics	Evolved attitudes to risk and the demand for equity
7:30pm-7:50pm	Strategic interference: When deception protects me and helps you	Strong Man, Generous Man, Warrior Man, Cheat: Determinants of status in an Amazonian community	Super-additive cooperation
7:50pm-8:10pm	Mate Recognition and Relationship Disqualifiers	Personality and Social Status in an Amazonian Community	On the evolution of male competitiveness
8:10pm-8:30pm	Demonstrate Values: Moral Outrage as a Cue to Long-Term Mating Potential	Hadza hunter-gatherers with greater exposure to other cultures preferentially share with generous campmates	'If you can, you must.' The evolutionary foundation of reference point choice and loss aversion
8:30pm-8:40pm	Break		
Session 9	<b>Naïve sociology: How infants and children represent social relations and structures</b> ohyay room: <i>The Mountain Room</i>	<b>The Psychology of Gossip: Cooperative and Competitive Functions</b> ohyay room: <i>The Beach Room</i>	<b>The Role of Body Shape in Human Social Life</b> ohyay room: <i>The Amphitheater</i>
8:40pm-9:00pm	Symposium moved to Session 10 (7/1 1:10pm-2:30pm EDT) and will be in <i>The Main Stage</i>	Gossip and Reputation in Everyday Life	Cross-cultural validation of the importance of cues of strength and reproductive value for male and female bodily attractiveness
9:00pm-9:20pm		Competitive gossip: The impact of domain, resource value, resource scarcity, and coalitions	Accurate visual estimates of reproductive value explain the association of women's bodily features with physical attractiveness
9:20pm-9:40pm		Gossip and boredom: Investigating the entertainment function of gossip	Fat location accounts for the poverty-obesity paradox in a nationally representative U.S. sample
9:40pm-10pm		What's up with gossip on WhatsApp: The evolutionary psychology of gossip in the digital age	Weight location moderates weight-based self-devaluation and perceived social devaluation in women

Thursday, July 1<sup>st</sup>

12pm-1pm	<b>Plenary: Michael Muthukrishna, introduction by Joe Henrich "CULTURAL EVOLUTIONARY PSYCHOLOGY"</b> ohyay room: <i>The Main Stage</i>			
1pm-1:10pm	Break			
Session 10	<b>Health, Mental Health, &amp; Neurodiversity</b> ohyay room: <i>The Mountain Room</i>	<b>Couples, Parents, &amp; Grandparents</b> ohyay room: <i>The Beach Room</i>	<b>Development &amp; Life History</b> ohyay room: <i>The Amphitheater</i>	<b>Naive sociology: How infants and children represent social relations and structures</b> ohyay room: <i>The Main Stage</i>
1:10pm-1:30pm	Explaining the autism spectrum: an evidence-based, evolution-framed approach	More religious women have larger and more kin dense social networks in a country undergoing rapid market integration.	The Hidden Talents Approach: Theoretical and Methodological Challenges	Early representations of social intimacy: Infants, toddlers, and children use saliva sharing as a cue of social closeness
1:30pm-1:50pm	Bad Feelings Are Usually Useless but Normal	Will granny save me? Birth status, survival, and the role of grandmothers	Development of False Belief Understanding in ni-Vanuatu Children	Infants assume social relations to be based on univocal coordination rules
1:50pm-2:10pm	Sex Ratio and Suicide across US Counties: A mediation analysis	Parental dimorphism and attractiveness as indicators of offspring quality	Infants' social evaluations depend on the beliefs guiding acts of help	The structural shape of social dominance hierarchies
2:10pm-2:30pm	Binge Drinking is Associated with Sex-Specific Cognitive Deficits: Evidence for Condition-Dependent Trait Expression in Humans	Families that stay together, stress together: Exploring couple satisfaction and cortisol synchrony within families	Taming the confusion in the human life history literature	Children prioritize relational over dispositional interpretation of third-party interactions
2:30pm-2:40pm	Break			
Session 11	<b>Contexts of development in humans and non-human primates</b> ohyay room: <i>The Mountain Room</i>	<b>Novel Insights into the Hormonal Processes Underlying Female Sociality</b> ohyay room: <i>The Beach Room</i>	<b>Theories of Knowledge</b> ohyay room: <i>The Amphitheater</i>	
2:40pm-3:00pm	Influences of Developmental Niche on the Emergence of Percussive Tool Use in Capuchin Monkeys ( <i>Sapajus libidinosus</i> )	Uncovering the hormonal underpinnings of female friendships	On the Automatic Nature of Threat: Physiological and Evaluative Reactions to Survival-Threats Outside Conscious Perception	
3:00pm-3:20pm	Effect of age and gender on the presence of object affordances at home	Hormonal predictors of maternal-infant social attunement in breastfeeding dyads	How the mind defines intentionality	
3:20pm-3:40pm	Social Network Analysis applied to child social behavior research: how the past can support the future?	Examining the extent to which testosterone and sociocultural factors explain women's (versus men's) lower dyadic sexual desire	Can a bean plant get sick like a cow? Evolution of folk biological knowledge with a shifting subsistence system	
3:40pm-4pm	Digital Media from a ethological point a view	Future directions in women's sex hormone research: Anovulation, progesterone, and hormonal interventions	When knowledge is hidden, and when it is shared: Specialization vs. mentorship from cross-cultural and evolutionary perspectives	

Friday, July 2<sup>nd</sup>

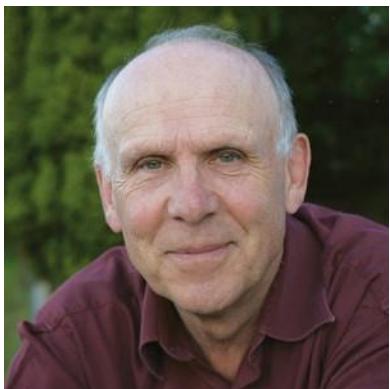
12pm-1pm	<b>Keynote: Richard Wrangham, introduction by John Tooby, "SELF-DOMESTICATION AND THE EVOLUTION OF HUMAN GROUPISHNESS"</b> ohyay room: <i>The Main Stage</i>		
1pm-1:10pm	Break		
Session 12	<b>Post-Doctoral Award Competition</b> ohyay room: <i>The Main Stage</i>		
1:10pm-1:30pm	Amanda Rotella, "Increasing population densities predict decreasing fertility rates over time: A 174-nation investigation"		
1:30pm-1:50pm	Duncan Stibbard-Hawkes, "Why Hunt? Why Gather? Why Share?: Hadza Self-Assessments of Foraging and Food-Sharing Motive"		
1:50pm-2:10pm	Leo Tiokhin, "Honest signaling in academic publishing"		
2:10pm-2:20pm	Break		
Session 13	<b>Fitness Interdependence and Social Behavior</b> ohyay room: <i>The Mountain Room</i>	<b>Mate Choice &amp; Relationship Maintenance</b> ohyay room: <i>The Beach Room</i>	<b>Skill &amp; Knowledge Ontogeny in Subsistence Societies</b> ohyay room: <i>The Amphitheater</i>
2:20pm-2:40pm	Functional Interdependence Theory: Adaptations for Perceptions of Interdependent Situations and Relationships	Testing Mate Choice Hypotheses in a Transitional Small Scale Population	Playing with fire: cross-cultural use of storytelling to encode pyrotechnological knowledge
2:40pm-3:00pm	Cooperating to show that you care: costly helping as an honest signal of fitness interdependence	Committed or Calibrated? Assessing Commitment Device and Relationship Maintenance Models of Love	Cultural change reduces gender differences in mobility and spatial ability among forager-pastoralist children, the Twa of northern Namibia
3:00pm-3:20pm	Reciprocity Creates Fitness Interdependence, Or Why You Should Help Even When Anonymous	The (Bidirectional) Associations Between Romantic Attachment Orientations and Mate Retention Behavior in Male-Female Romantic Couples	The life history of learning subsistence skills among Hadza and BaYaka foragers from Tanzania and the Republic of Congo
3:20pm-3:40pm	How is the COVID-19 pandemic affecting cooperation and interdependence?	Competitive nonverbal flirting among women, the tactics used and their perceived effectiveness	Age profiles of ethnobiological knowledge in off-grid pastoralist Choyeros (Baja California Sur, Mexico)
3:40pm- 4:00pm	<b>Closing Remarks</b> ohyay room: <i>The Main Stage</i>		
4pm EDT on!	<b>Social Hour</b>		

# Keynote Address

## Self-Domestication and the Evolution of Human Groupishness

Dr. Richard Wrangham

Abstract: Christopher Boehm (1999, 2012, 2018) has argued that many genetically based aspects of human morality originated and evolved as a result of late Pleistocene *Homo* being able to cheaply kill alpha males. In this talk I support and extend Boehm's analysis. I show that the style of killing that was apparently needed for this process does not occur in chimpanzees or any other nonhuman. The style, called targeted conspiratorial killing, is expected to have had two major and essentially simultaneous effects. One was self-domestication, which is datable by genetics and anatomy to the origin of *Homo sapiens* and would have had numerous adaptive and pleiotropic consequences. The other is selection for "groupishness", i.e. the psychological mechanisms that underlie human ultrasociality and often appear to transcend self-interest. Both effects are reconstructed as being due to male competitive strategies. This scenario suggests the unfashionable view that the origins of many specifically human adaptations for ultrasociality lie in the dynamics of male-male relationships. A male-biased history of the origin both of *Homo sapiens* and of much of our uniquely groupish behavior represents a sensitive political issue in an era when canonical views of the evolution of ultrasociality often ignore sex differences, and when the academy rightly aspires to equitable recognition of the significance of each gender.



**Richard Wrangham** is the Ruth Moore Research Professor of Biological Anthropology in the Department of Human Evolutionary Biology at Harvard University, where he taught from 1989 to 2020. His major interests are chimpanzee and human evolutionary ecology, the evolutionary dynamics of violence and non-violence, and ape conservation. He received his Ph.D. in Zoology from Cambridge University in 1975, was a Research Fellow at King's College (Cambridge) from 1977 to 1980, and taught at the Department of Anthropology at the University of Michigan (Ann Arbor) from 1981-1989. Since 1987 he has studied wild chimpanzee behavior in Kibale National Park, Uganda. He has been President (2004-2008) of the International Primatological Society, and an Ambassador for UNEP/UNESCO's Great Ape Survival Project (GRASP). Wrangham was awarded a MacArthur Foundation Fellowship in 1987, and is a Fellow of the American Academy of Arts and Sciences and the British Academy. His most recent books are *Catching Fire: How Cooking Made Us Human* (Basic Books, June 2009) and *The Goodness Paradox: The Strange Relationship Between Virtue and Violence in Human Evolution* (Pantheon, January 2019).

# Plenary Addresses

## How Plants Shape the Mind

Dr. Annie Wertz

Abstract: Life is mostly plants. Plants constitute an estimated 80% of the biomass on Earth and are concentrated in terrestrial environments. Millions of animal species rely on plants to survive and the organismic design of plants and animals have been tightly interwoven in intricate ways over evolutionary time. As a corollary, the cognitive design of any animal that is dependent on plants must bear the markers of this relationship. While this logic has been a driver of research on nonhuman animals, it has received surprisingly little attention in the human cognitive sciences. In this talk, I outline some of the ways that plants have shaped the human mind. I will begin with a task analysis of plant foraging that focuses on the problem of identifying specific plants. Then I will present findings from recent studies of infants and young children that address two aspects of this task analysis: 1) distinguishing plants from other entities and 2) categorizing different types of plants and plant parts. I will argue that these aspects of cognitive design are integral components of social learning systems for acquiring information about plants, and demonstrate that plants have structured the design of fundamental cognitive capacities.



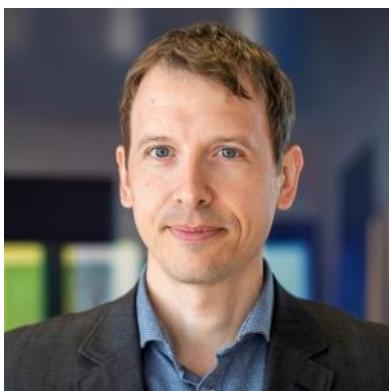
**Annie E. Wertz** is a Research Group Leader (equivalent to Assistant Professor) at the Max Planck Institute for Human Development in Berlin, where she leads the independent Max Planck Research Group “Naturalistic Social Cognition.” She received her PhD in Psychology from the University of California, Santa Barbara in 2009 and then worked as postdoctoral researcher in the Yale University Infant Cognition Center until 2014. Her research interrogates the evolution and development of cognition, with a particular focus on social learning mechanisms. Her work provided the first evidence that human infants possess behavioral and social learning strategies that are selective to plants. Along with her research group, she conducts laboratory studies and naturalistic observations of human infants and young children, and engages in collaborative cross-cultural and comparative research projects to examine the design and development of selective social learning mechanisms.

## **The Destructive Side of Status-Seeking: How Status-Seeking Drives Extreme Political Discontent when Alone, in Groups, in the Streets and on the Internet**

Dr. Michael Bang Petersen

**Abstract:** Modern democracies are currently experiencing destabilizing events including the emergence of demagogic leaders, the onset of street riots, circulation of misinformation and extremely hostile political engagements on social media. In this talk, I draw together a series of recent studies to argue and demonstrate that the evolved psychology of status-seeking lies at the core of this syndrome of extreme political discontent, whether it involves groups engaged in street riots or lonely Internet trolls who spread “fake news”.

Social status constitutes one of the key adaptive resources for any human, as it induces deference from others in conflicts of interest. Prior research has identified two routes to status: Prestige acquired through service and dominance acquired through coercion. I will argue and demonstrate that extreme political discontent involves behaviors aimed at dominance through engagement in either individual aggression or in mobilization processes that facilitate coalitional aggression. Furthermore, I will argue that the most extreme forms of political discontent involve a particular evolved status-acquisition strategy, focusing on generalized destruction of entire status-hierarchies. This strategy is triggered in contexts of deep feelings of marginalization and exclusion, which are becoming widespread in the increasingly unequal Western societies.



**Michael Bang Petersen** is a professor of political science at Aarhus University in Denmark and received his PhD from the same university in 2007. His research is focused on the intersection of political science and evolutionary psychology, analyzing modern political issues and problems through the lenses of evolutionary psychology. On this topic, he has published in the major journals within both political science and psychology. As a junior scholar, he received training in evolutionary psychology at UCSB. Today, he is a member of the Royal Danish Academy of Sciences and Letters and serves as the PI of two large research projects on online political hostility and pandemic behavior, respectively. He has served as an advisor of the Danish government throughout the corona pandemic.

## The Human Colony: Origins and Function

Dr. Magdalena Hurtado

**Abstract:** The “Human Colony” is a term I use to refer to the universal blueprint of the inputs, flows, and outputs of the built environments that humans invent. The Human Colony’s blueprint is universal and adaptable, taking on different dynamics as it changed the very conditions it started from 100,000 years ago in Africa, and as it adapted to the conditions it created anew since that time. The blueprint consists of observable physical and behavioral extensions of fertility- and survival-work modules and the tacit rules that produce them. These tacit rules give life to the Human Colony, but what are they, and what function do they serve? There are more rules than we can ever know, so I looked for the essential few. They are divisions of labor working together in different sub-systems of the Colony. Susceptibility-based divisions of labor dictate individuals’ fertility and survival work schedules. Divisions of labor within and between pathways of the human immunological and central nervous systems dictate without conscious perception the allocation of energy into somatic growth, somatic maintenance, reproduction, and social capital. Taken together, the Human Colony’s blueprint and tacit rules serve one function: to improve human population health through horizontal and vertical replication of its sub-systems. The most important implication of the Human Colony paradigm for the 21st Century is that the production of population health is the centerpiece of our species’ natural history and expansion. Ignoring this conclusion, if accurate, while increasing our reliance on artificial intelligence within the narrow scope of public health disciplines may stymie the hope of a better life for all.



**Magdalena Hurtado** is known for theoretical and empirical research on the evolutionary origins of the sexual division of labor, human life history traits including menopause, paternal investment, infectious disease patterns among tribal populations, and the emergence of modern diseases such as childhood asthma. Especially known for empirical work on women in remote hunter-gatherer populations and co-authored book *Ache Life History*. Most recently, worked on the evolutionary emergence of cooperative public health behaviors as a key human adaptation. First to use indifference curve models to describe the tradeoffs that women face between childcare and subsistence work and to show with field data from hunter-gatherers that in our species women's subsistence activities are probably always constrained by the age and number of their offspring and the productivity of their husbands. Described detailed age specific infection patterns of a tuberculosis epidemic in a group of hunter-gatherers, with extremely high prevalence, who had never been exposed to this mycobacterium, and published a review of South American indigenous health research with an emphasis on the high susceptibility to infectious diseases such as helminthiasis, hepatitis A-E, and HTLV-I and II. Published data on the prevalence of asthma among different Hispanic subgroups in the United States, and developed a biocultural hypothesis to account for these differences, as well as a theory of mast-cell saturation and Th2 dominance that helps explain the emergence of asthma in modern populations. Work has expanded to Panamanian populations to study the origins of public health using models in evolutionary social psychology. Basic science research dovetails applied work in the areas of health and conservation. Advocate for increased public health services aimed at disadvantaged native populations. Designed and implemented grassroots health care worker and conservation programs that resulted in rapid declines in rates of preventable deaths and land titles to ancestral territories in native communities of Paraguay and Venezuela.

## Sex-Biased Genome Evolution

Dr. Melissa Wilson

Abstract: I will present research and theory connecting the intersecting evolution of sex chromosomes, the placenta, and pregnancy, and how those combine to result in sex differences in many human diseases . I will propose how changes in industrialized society (e.g., having fewer pregnancies, and potentially even that the age at first reproduction is later) may be exacerbating these sex differences. In particular, we hypothesize that, ancestrally, sex-specific immune modulation evolved to facilitate survival of the pregnant person in the presence of an invasive placenta and an immunologically challenging pregnancy – an idea we term the ‘pregnancy compensation hypothesis’ (PCH). Further, we propose that sex differences in immune function are mediated, at least in part, by the evolution of gene content and dosage on the sex chromosomes, and are regulated by reproductive hormones. Finally, we propose that changes in reproductive ecology in industrialized environments exacerbate these evolved sex differences, resulting in the increasing risk of autoimmune disease observed in females, and a counteracting reduction in diseases such as cancer that can be combated by heightened immune surveillance. The PCH generates a series of expectations that can be tested empirically and that may help to identify the mechanisms underlying sex differences in modern human diseases. I will also discuss how the potentially confounding observations of male-biased disease severity and death due to COVID-19, and the female-bias of severe response to the SARS-CoV2 vaccines are consistent with the PCH.



**Melissa Wilson** is a computational evolutionary biologist whose main research interests include sex-biased biology and how this affects human health and disease. Atypical sex chromosome copy numbers occur frequently in humans (Turner Syndrome, individuals with a single X, occurs in 1/2500 live female births, and Klinefelter syndrome, XXY, occurs in 1/1000 males). The clinical consequences of sex chromosome copy variation is dramatically influenced by the evolutionary history of the human sex chromosomes. The Wilson lab is focusing on understanding the evolution of sex-linked gene content and how this contributes to human disease. In particular, the Wilson lab studies how to more accurately quantify variation on the sex chromosomes and how to conduct sex-stratified analyses. This work is being applied to study variation in human cancers and in the placenta. The Wilson lab also studies how patterns of variation on the sex chromosomes hold signatures of our evolutionary history as human beings, including sex-biased bottlenecks and selection that may leave some populations more vulnerable to specific diseases. The Wilson lab uses modeling and population genomics analyses of patterns of observed DNA variation to understand human demographic history.

## Cultural Evolutionary Psychology

Dr. Michael Muthukrishna

Abstract: The last decade has seen a convergence between genetic and cultural evolution in the human sciences. New research often uses formal theoretical approaches, describes common human psychology grounded in a “theory of human behavior”, and predicts and tests global and historical variation using improved statistical and empirical methods. To unify this work under a common framework, I’ll introduce the Cultural Brain and Collective Brain Hypotheses. I’ll explain how these hypotheses shed light on our understanding of intelligence, innovation, cooperation and the “paradox of diversity”. Finally, I’ll discuss ways we can move beyond WEIRD psychology in a global collaborative manner, strengthen the links between basic and applied policy research (if it doesn’t work in the real world, it doesn’t work at all), and discuss the importance of historical psychology.



**Michael Muthukrishna** is Associate Professor of Economic Psychology and Affiliate of the STICERD Developmental Economics group at the London School of Economics (LSE), Technical Director of the Database of Religious History, and CIFAR Azrieli Global Scholar at the Canadian Institute for Advanced Research program for Boundaries, Membership, and Belonging. His research focuses on human biological and cultural evolution and how the “theory of human behavior” that emerges from this research can be used to improve innovation, reduce corruption, and increase cross-cultural cooperation. His work has been featured in a variety of news outlets including *CNN*, *BBC*, *Wall Street Journal*, *The Economist*, *The Guardian*, *The Telegraph*, *The Times*, *Scientific American*, *Nature News*, and *Science News*. He advises both governments and organizations. Michael’s research is informed by his educational background in engineering and psychology, with graduate training in evolutionary biology, economics, and statistics, and his personal background living in Sri Lanka, Botswana, Papua New Guinea, Australia, Canada, United States, and the United Kingdom. He is currently working on a book to be published with *MIT Press*. More information available here: <https://michael.muthukrishna.com/>

# Symposium Presentations

Session 1: Thursday, June 24th 1:10pm-2:30pm EDT

*Social Networks, Social Support, and Kinship*

**Testing the buffering hypothesis: breastfeeding problems, cessation and social support in the UK**

*Page, Abigail E.; Myers, Sarah; Emmott, Emily<[Abigail.Page@lshtm.ac.uk](mailto:Abigail.Page@lshtm.ac.uk)>*

Objectives: Physical breastfeeding problems can lead women to terminate breastfeeding earlier than planned. In high-income countries such as the UK, breastfeeding problems have been attributed to the cultural and individual “inexperience” of breastfeeding, ultimately leading to lower breastfeeding rates. Yet, cross-cultural evidence suggests breastfeeding problems still occur in contexts where breastfeeding is common, prolonged and seen publicly. This suggests breastfeeding problems are not unusual and do not necessarily lead to breastfeeding cessation. As humans evolved to raise children cooperatively, what matters for breastfeeding continuation may be the availability of social support during the postnatal period. Here, we test the hypothesis that social support buffers mothers from the negative impact breastfeeding problems have on duration. Methods: We run cox models on a sample of 565 UK mothers who completed a retrospective online survey about infant feeding and social support in 2017-2018. Results: Breastfeeding problems were important predictors of cessation; however, the direction of the effect was dependent on the type of problem. These relationships were also moderated by informational, practical and emotional support from a range of supporters. Helpful support for discomfort issues (blocked ducts, too much milk) significantly reduced the hazard of cessation, as predicted. However, helpful support for reported milk insufficiency increased the hazard of cessation. Conclusions: Experiencing breastfeeding problems is the norm, but its impact may be mitigated via social support. Working from an interdisciplinary approach, our results highlight that a wide range of supporters who provide different types of support have potential to influence maternal breastfeeding experience.

**Do post-marital residence patterns affect women's ability to mobilize social support?**

*Alami, Sarah; Seabright, Edmond; Kraft, Thomas S.; Kaplan, Hillard; Gurven, Michael <[sarah00@umail.ucsb.edu](mailto:sarah00@umail.ucsb.edu)>*

Consanguineal relatives are important providers of support in many species. A distinguishing feature of human kinship systems is the recognition and maintenance of cooperative relationships with affinal relatives. This cultural aspect of kinship provides opportunities for women to expand their social support networks, and is particularly important for understanding patterns of post-marital residence. Here, we explore extra-household social network size for women and observed allocare of children under the

age of ten under different residence settings, among ambilocal Tsimane forager-farmers. We find that women in neolocal settings had on average 50% smaller extra-household social network size, but no significant differences in network size were found between matrilocal, patrilocal or bilocal settings. Among Tsimane, overall levels of direct allocare are surprisingly low. Only ~23% of recorded active childcare was undertaken by people other than the mother. Matrilocal residence increased the odds of a child receiving allocare relative to patrilocality ( $OR=1.52$ ). We discuss the role that women's social support networks and women's agency may have played in the evolution of marriage systems.

### **Cooperative networks are structured by religious affiliation in Vanuatu**

*Seixas, Bernardo U.; Massengill, Eric; Reynolds, Adam; Mattison, Siobhán <[bubaldo@unm.edu](mailto:bubaldo@unm.edu)>*

Humans are highly cooperative. Significant research has facilitated understanding of how cooperation is structured across various activities in relation to gender, social structure (e.g., relatedness), geographic proximity, and reciprocity. Religion has also been shown to structure cooperative social networks, yet the specific domains of cooperation facilitated by religious homophily remain under-investigated. Here, we use social networks to demonstrate that religious affiliation is a stronger predictor of cooperation in Vanuatu than traditionally studied characteristics, such as reciprocity and relatedness. By comparing how religious identification, relatedness, reciprocity, and distance between dwellings performed in predicting various types of cooperative activity, we found that religion was the only one that attained significance at  $p < 0.001$  for all types of cooperation. Of special interest was the result that individuals having the same religion was a better predictor of who they reportedly trusted with childcare than either relatedness or distance between households. Altogether, our results present additional evidence that religious similarity between people is reflected in cooperative social networks and likely related to greater cooperation, even in domains traditionally thought to be patterned more by relatedness, such as childcare. We suggest that in the Vanuatu context, this is because religion reaffirms shared identity and cooperative networks, rather than because individuals are using religion as a means of displaying their value as cooperative partners, but future tests will help to resolve alternative hypotheses.

### **Market Integration and Transitions in Fertility, Marriage, and Kinship Systems**

*Shenk, Mary K. <[mks74@psu.edu](mailto:mks74@psu.edu)>*

The process of integration into a global market economy is increasingly affecting and defining life in much of the developing world with a cascade of consequences for systems of production, reproduction, and social relationships. In this talk I discuss the key outcomes of market integration for fertility, marriage, and kinship systems in South Asia using examples from my work in Bangladesh, India, and Pakistan. I argue that industrialization and market integration sparked a demographic transition to lower fertility, and that together these economic and demographic transitions have directly and indirectly precipitated a further series of changes in whether marriages are arranged,

the likelihood of marrying kin, and the form of marriage transactions including a switch from brideprice to dowry. Using logic from evolutionary ecology, I interpret these changes as outcomes of two strategic shifts in individual behavioral strategies—one towards lower fertility and higher parental investment, and the other from intensive to extensive kin relationships—occurring simultaneously in the economic and social context of market integration.

## *Law, Justice, and Morality*

### **The origins of criminal law**

*Sznycer, Daniel; Patrick, Carlton <[dsznycer3@gmail.com](mailto:dsznycer3@gmail.com)>*

Laws against wrongdoing, past and present, appear to originate in justice intuitions that are part of universal human nature. This theory can trace laws to neurocognitive mechanisms and ancestral selection pressures. A distinct prediction follows from this: that lay people can intuitively recreate the laws of familiar and unfamiliar cultures, even when they lack the relevant explicit knowledge. To evaluate it, we conduct preregistered experiments with Chinese and Mesopotamian laws that are millennia old; stimuli that preserve in fossil-like form the legal thinking of ancient lawmakers. We show that laypeople's ( $N = 1,800$ ) justice intuitions closely match the logic and content of those archaic laws. We also show covariation across different types of justice intuitions: interpersonal devaluation of offenders, judgments of moral wrongness, mock-legislated punishments, and perpetrator shame—indicating that multiple justice intuitions are regulated by a common social-evaluative psychology. These findings suggest that the origin of criminal laws is a cognitively sophisticated human nature.

### **Moral Molecules: Morality as a combinatorial system**

*Curry, Oliver Scott; Alfano, Mark; Brandt, Mark; Pelican, Christine<[oliver.curry@anthro.ox.ac.uk](mailto:oliver.curry@anthro.ox.ac.uk)>*

How many moral values are there? And what are they? According to the theory of morality-as-cooperation, morality is a collection of biological and cultural solutions to the problems of cooperation recurrent in human social life. This theory predicts that there will be as many different types of morality as there are different types of cooperation. Previous research, drawing on evolutionary game theory, has identified at least seven different types of cooperation, and used them to explain seven different types of morality: family values, group loyalty, reciprocity, heroism, deference, fairness and property rights. Here we explore the conjecture that these simple moral 'elements' combine to form a much larger number of more complex moral 'molecules', and that as such morality is a combinatorial system. For each combination of two elements, we hypothesise a candidate moral molecule, and successfully locate an example of it in the professional and popular literature. These molecules include: fraternity, blood revenge, family pride, filial piety, gavelkind, primogeniture, friendship, patriotism, tribute, diplomacy, common ownership, honour, confession, turn taking, restitution, modesty, mercy, munificence, arbitration, mendicancy, and queuing. These findings indicate that

morality – like many other physical, biological, psychological and cultural systems – is indeed a combinatorial system. Thus morality-as-cooperation provides a principled and powerful theory, that explains why there are many moral values, and successfully predicts what they will be; and it generates a systematic framework that has the potential to explain all moral ideas, possible and actual.

### **Stereotypes of criminality track ecology, not race**

*Williams, Keelah <[kewillia@hamilton.edu](mailto:kewillia@hamilton.edu)>*

Why do perceivers use race to infer a target's propensity for criminal behavior? A series of studies demonstrates that many race stereotypes about criminality actually reflect inferences of the target's presumed home environment. Because race is confounded with ecology in the United States, American perceivers use race as a heuristic cue to ecology, stereotyping Black individuals as more likely than White individuals to exhibit traits associated with harsh and unpredictable environments (such as criminality). Four studies ( $N = 1261$ ) provide evidence that (1) people strongly associate certain crimes with Black individuals (e.g., resisting arrest) and other crimes with White individuals (e.g., cybercrime), but (2) these race stereotypes disappear in the presence of more proximate cues to ecology. That is, although stereotypically "Black" crimes are associated with Black targets in the absence of ecology information, when ecology information is presented these associations are greatly diminished or altogether eliminated. These findings suggest a potentially novel approach to reducing discriminatory outcomes in the legal system: race differences in legal outcomes should be attenuated to the extent that targets present similar cues to ecology.

### **Injustice, inequality, grievance, and homicide**

*Daly, Martin <[daly@mcmaster.ca](mailto:daly@mcmaster.ca)>*

Income inequality has proven to be the best single predictor of the variability in homicide rates both among nation states and among smaller jurisdictions within countries. Arguably, that is because economic inequality is a major component and determinant of the intensity of competition among men, and most homicidal violence reflects male-male competition. However, other factors clearly matter, too. Additional variables that have been found relevant in various studies include inequality between visible subgroups over and above that among individuals, impunity (the likelihood that crimes will go unpunished), life expectancy (with homicide's impact removed to avoid circularity), and the perceived legitimacy of the governments that identify and punish crimes. All of these factors are related, more or less directly, to injustice and grievance, the relevance of which is underlined by the fact that many - perhaps most - killers see themselves as moral agents engaged in rectifying wrongs. Developing more satisfactory, multifactorial models of the causation of homicide requires that we grapple with the psychology of fairness, injustice, and grievance.

## *Coalitional Psychology*

### **Intergroup Conflict and Preferences for Dominant Leaders: Testing Universal Features of Human Followership Psychology across 25 Countries**

*Laustsen, Lasse; Sheng, Xiaotian; van Vugt, Mark <[ll@ps.au.dk](mailto:ll@ps.au.dk)>*

Research shows that followers exhibit heightened preferences for dominant leaders in situations of intergroup conflict and coalitional competition (e.g. Little et al., 2007; Spisak et al., 2012; Laustsen & Petersen, 2017). Accordingly, humans are theorized to possess an evolved psychology of adaptive followership that flexibly regulates preferences for leader dominance in accordance with levels of intergroup conflict (Laustsen & Petersen, 2015). However, existing research is based exclusively on studies conducted in the US or Western Europe. Consequently, the central claim that the adaptive followership psychology constitutes a human universal remains untested. This project tests if followers across the Globe—spanning 25 countries (across six continents) such as Colombia, Kenya, Pakistan, Hungary and China—hold stronger preferences for dominant leaders during intergroup conflict. Building on existing experimental protocols, subjects we assigned subjects randomly to either an intergroup conflict condition or a no-conflict condition asking them to choose their favored leader from dominant and non-dominant looking alternatives. Results robustly show that humans across the Globe respond with stronger preferences for dominant leaders when they find themselves in contexts of intergroup conflict. Hence, the project provides unique and unprecedented support for the notion of a universal and context sensitive human followership psychology.

### **A Sufficiency Test of the Alliance Hypothesis of Race**

*Conroy-Beam, Daniel; Ghezae, Isaias; Pietraszewski, David<[dconroybeam@ucsb.edu](mailto:dconroybeam@ucsb.edu)>*

Racial categorization is a widespread phenomenon at the root of many of the most pressing problems in modern human life. These facts are peculiar from an evolutionary perspective given that racial categories as we understand them today are not biologically real and are evolutionarily novel inventions. The alliance hypothesis of race attempts to reconcile these facts by proposing that modern racial categorization is a byproduct of a system designed for ancestral alliance detection. Support for this hypothesis comes from studies demonstrating that redirecting coalitional psychology can suppress racial categorization. However, the capacity of coalitional psychology to generate racial categories from scratch is less clear. Here we use a series of agent-based models to provide a sufficiency test of the alliance hypothesis. We generate populations of agents that vary on arbitrary phenotypic dimensions and engage in cooperative interactions with one another. We show that the introduction of a coalitional psychology that attempts to detect patterns of allegiance based on available cues can hallucinate and then reify correlations between phenotype and allegiance, leading to the emergence of social groups that vary systematically by phenotype. This occurs even when phenotype is in reality distributed continuously and has no true connection to behavior. Furthermore, consistent with psychological evidence, such phenotypic

classification is suppressed when valid cues of allegiance are made available. These models provide evidence that a coalitional psychology alone can be sufficient to create beliefs in phenotype-based social categories even when no such categories truly exist.

### **Competition and inter-group relationship in human cooperation: a case study in a historic Italian city**

*Kenny, Adam; Fortunato, Laura <[adam.kenny@anthro.ox.ac.uk](mailto:adam.kenny@anthro.ox.ac.uk)>*

Cooperative behaviour is known to be biased: across societies, people cooperate more with in-group members than with out-group members. Yet the precise effect of various factors on the level of bias remains unclear. For example, does competition increase in-group cooperation, and/or does it decrease out-group cooperation? Does the level of cooperation differ when faced with members of a rival out-group, vs. members of a neutral out-group? The Contrada system in the city of Siena, Italy provides a real-world setting to address these and related questions. Members of the 17 Contrade participate in year-round activities and rituals, identifying strongly with their in-group, and experiencing intense competition during the Palio horse race in the summer. We recruited 367 members to play a modified dictator game in a lab-in-the-field setting. We conducted the study during periods of low and high competition, and exploiting variation in relationship across Contrade: some pairs are neutral competitors, whereas others are designated allies or rivals. Contrada members showed a general propensity to favour in-group members over out-group members. However, we found limited evidence for an effect of the level of competition (low vs. high) on cooperation. We found an effect of group relationship, with cooperative behaviour between neutral out-groups and hostile behaviour predominantly between rival out-groups. We discuss the findings in the context of the literature on the evolution of human cooperation, and against the ethnographic background for the Contrada system.

### **Microaggressions as a Form of Low-Cost Intergroup Bargaining: Experimental Evidence** **TALK CANCELED**

*Lindner, Miriam; Krasnow, Max <[mlindner@fas.harvard.edu](mailto:mlindner@fas.harvard.edu)>*

While the microaggression concept has recently garnered attention across college campuses and workplaces, empirical research on the phenomenon remains in its nascence. Here, we test an evolutionary psychological theory of how microaggressions may result from an evolved cognitive architecture for intergroup bargaining. On this theory, microaggressions are a form of low-cost, indirect intergroup aggressive communication used under conditions of (1) advantageous inequality and (2) high levels of uncertainty over power equilibria. We test our predictions utilizing a survey experiment on US adults ( $N = 1,000$ ). Respondents were assigned to short vignettes altering five experimental factors – speech act (microaggression vs. direct insult), perpetrator sex, victim sex, and category of group membership (race, sex, ethnicity, religious orientation, and sexual orientation). Subsequently, they reported their emotions, their inferences of how the perpetrator values the individual victim, other members of the victim's group, and other members of the perpetrator's group (that is,

their inferred WTRs). We find that respondents hear microaggressions as a merely ambiguous alternative to explicit intergroup insults, with similar activation of bargaining emotions (e.g., anger) and similar inferences about group based WTR. To our knowledge, this study represents the first rigorous, empirically driven examination of microaggressions across various marginalized group memberships.

## Session 2: Thursday, June 24<sup>th</sup> 2:40pm-4:00pm EDT

### *New Investigator Competition*

#### **Universal and variable leadership dimensions across human societies**

*Zachary H. Garfield, Kristen L. Syme, and Edward H. Hagen<[zachary.garfield@iast.fr](mailto:zachary.garfield@iast.fr)>*

Many researchers have turned to evolutionary theory to better understand diversity in leadership. Evolutionary theories of leadership, in turn, draw on ethnography from societies thought to more closely resemble the smaller-scale communities in which humans evolved. Currently, there is limited systematic data on the nature of leadership in such societies. We coded 109 dimensions of leadership relevant to evolutionary models, in 1212 ethnographic texts from 59 nonindustrial populations in Human Relations Area Files. We discovered evidence for both cultural universals in leadership, as well as variation by region, subsistence, group context, and gender. Candidate universals included that leaders were intelligent and knowledgeable, resolved conflicts, and received material and social benefits. Evidence for other dimensions varied by group context (e.g., leaders of kin groups tended to provide counsel and direction), subsistence (e.g., hunter-gatherers leaders tended to lack coercive authority), and gender (e.g., female leaders tended to be associated with family contexts). There was generally more evidence of benefits than costs with material, social, and mating benefits being particularly important for leaders, and material and other benefits important for followers. Shamans emerged as an important category of leaders who did not conform to influential models emphasizing two leader strategies: using knowledge and expertise to provide benefits to followers vs. using physical formidability to impose costs. Instead, shamans and leaders with supernatural abilities used their knowledge to both provide benefits and impose costs. We, therefore, propose leaders deploy their cognitive, social, material, and somatic capital to provide benefits and/or impose costs on others.

#### **Small gods, rituals, and cooperation: The Mentawai water spirit Sikameinan**

*Singh, Manvir; Kapchuk, Ted; Henrich, Joseph<[manvir.singh@iast.fr](mailto:manvir.singh@iast.fr)>*

Cognitive and evolutionary research has focused on the powerful deities of large-scale societies, yet little work has examined the smaller gods of animist traditions. In a study of the water spirit Sikameinan of the Mentawai people (Siberut Island, Indonesia), we address three questions: (1) Are smaller gods believed to enforce cooperation, especially compared to bigger gods in larger-scale societies? (2) Do beliefs in these deities encourage people to engage in behavior otherwise perceived as costly? and (3) Does ritual reinforce beliefs in these deities? Drawing on interview responses, data from

healing ceremonies, and ethnographic observation, we show that Sikameinan is believed to punish people who violate meat-sharing norms and that people 'attacked' by Sikameinan pay shamans to conduct healing rituals. The public nature of rituals, involving prestigious individuals apologizing to Sikameinan for the patient's stinginess, reinforce onlookers' beliefs about Sikameinan. The most widely shared beliefs about Sikameinan are represented in rituals while beliefs not represented vary considerably, indicating that ritual may be potent for cultural transmission. These results suggest that moralizing supernatural punishers may be more common than suspected and that the trend in the cultural evolution of religion has been an expansion of deities' scope, powers, and monitoring abilities.

### **What is the shape of plasticity in a fluctuating environment? An evolutionary model of incremental development**

*Walasek, Nicole; Frankenhuis, Willem; Panchanathan, Karthik*<[n.walasek@psych.ru.nl](mailto:n.walasek@psych.ru.nl)>

Sensitive periods, in which the impact of experience is larger than other periods, are widespread in nature, but little is known about their evolution. Recent mathematical modeling has explored the conditions in which natural selection favours sensitive periods. These models have provided insight but share two limitations: they have either assumed that the environment is stable across ontogeny, and/or that organisms can develop phenotypes instantaneously at any age. However, organisms may experience changing conditions and often construct phenotypes incrementally. Here, we present a model in which organisms gradually tailor their phenotypes to an environment that fluctuates across ontogeny, while receiving cost-free, imperfect cues to the environmental state. We vary the rate of environmental change, the reliability of cues, and the duration of adulthood relative to ontogeny. We use stochastic dynamic programming to compute optimal policies. From these policies, we simulate plasticity across ontogeny and obtain distributions of mature phenotypes. Our results show that sensitive periods occur at the onset and halfway through ontogeny, but not at the end. Though plasticity always declines towards the end of ontogeny, in contrast to models of stable conditions, it rarely drops to zero. We conclude that critical periods, in which plasticity ends, are unlikely to be favoured in environments that fluctuate across ontogeny.

### **Evolution of kinship structures driven by marriage tie and competition**

*Itao, Kenji; Kaneko, Kunihiko* <[itao-kenji363@g.ecc.u-tokyo.ac.jp](mailto:itao-kenji363@g.ecc.u-tokyo.ac.jp)>

In indigenous societies, people are categorized into several cultural groups, so-called clans. The clan attribution governs the mating and descent relationships by certain rules. Such rules form various kinship structures. Anthropologists have revealed several classes of kinship structures and corresponding cultural characteristics. Here, we introduce an agent-based model of indigenous societies adopting the multi-level evolution of families and societies. A family is a unit of dynamics and society is an ensemble of families within which the interaction of families can take place. We assign each family a trait and a mate preference as an optimal trait of the bridegroom. Marriage takes place according to the mating preference. Families with similar traits cooperate

with each other as well as with mates, whereas those with similar preferences compete for mates. The population of families is increased by such cooperation and declined by competition. With numerical simulations, families were found to form clusters in trait-preference space under a certain condition. Families in the same cluster are united by cultural similarity. Marriage occurs only between families from different clusters. Such clusters can be regarded as clans. Kinship structures emerge as the marriage and descent relationships of such clans. The emergent structures depend on environmental conditions such as the necessity of cooperation and strength of mating competition. Finally, by analyzing the global ethnographic database, called the Standard Cross-Cultural Sample, we empirically verify the theoretical results on the environmental dependence of kinship structures.

## Session 3: Friday, June 25<sup>th</sup> 1:10pm-2:30pm EDT

*Social development- a comparative approach*

**Toddlers, tools, and tech: The cognitive ontogenesis of innovation**

*Bruce Rawlings, Cristine H. Legare <[bruce.rawlings@utexas.edu](mailto:bruce.rawlings@utexas.edu)>*

The development of tool innovation in children presents a paradox. How do humans have such diverse and complex technology, ranging from smartphones to biomedicine to aircraft, and yet young children find even simple tool innovation challenges, such as fashioning a hook to retrieve a basket from a tube, remarkably difficult? We propose that the solution to this paradox is the cognitive ontogenesis of tool innovation. Using examples from the literature, we describe how it takes most of childhood for children, from diverse populations, to reliably solve simple tool innovation tasks. Then, using a common measure of children's tool innovation, we describe how multiple cognitive mechanisms, including executive functions, creativity, planning, problem solving, causal reasoning and social learning work in concert at each step of its process: recognizing the problem, generating appropriate solutions, and the social transmission of innovations. Each of these cognitive mechanisms facilitate our ability to flexibly complete goal-directed behaviors and continue to develop into adolescence, when children can consistently master tool innovation challenges. We thus highlight how the field should integrate cognitive architecture and tool innovation. We will also discuss what the ontogeny of this skill tells us about cognitive and cultural evolution and argue that more diverse measures of children's tool innovation are required to fully understand why it is such a difficult and late developing skill for children.

**Early social development in wild capuchin monkeys *Sapajus libidinosus* and *S. xanthosternos***

*Patrícia Izar, Marie-Caroline Franco-Rogelio, Emily Faverin, Viviane Nogueira da Silva, Irene Delval <[patrizar@usp.br](mailto:patrizar@usp.br)>*

In robust capuchin monkeys, there is variation in the social structure congruent with variation in ecological features and demography of groups. Groups of *S. libidinosus*

inhabiting the ecotone Cerrado/Caatinga are characterized by a steep intrasex dominance hierarchy related to high intragroup competition for food. Groups of *S. xanthosternos* inhabiting the northeastern Atlantic Forest are characterized by a partial and tolerant female dominance hierarchy, related to lower direct competition for food and high levels of affiliation. In both populations, female dominance over males is proportional to sex ratio in the groups. These social patterns are consistent in each population characterizing a social style. Here we address whether these social styles emerge during different development trajectories. We will discuss four studies on the development of the social style and the intimate association network during the infancy and early development of wild individuals born in both populations from ages 0 to 36 months. Our results show that in both populations there is high intraindividual variance in sociability and network metrics during early development, consistent with our hypothesis. We suggest that conservation efforts should take into account that preserving phenotypic diversity means preserving the contexts promoting behavioral plasticity.

### **The ontogenetic aspects of using social information in dogs**

*Natalia Albuquerque, Carine Savalli, Francisco Cabral, Briseida Resende <[nsalbuquerque@usp.br](mailto:nsalbuquerque@usp.br)>*

Dogs and humans possess something that seems to be unique in all of the animal kingdom: their close, intimate, mutually advantageous, and multifaceted interactions and relationships, that are product of tens of thousands of years of shared evolutionary history, but also of the experiences they have throughout their lives within multispecies social groups. Dogs are known to be able to read social information from humans, such as reputation-like inferences based on how people behave towards their owner, communicative gestures in a variety of contexts, and human emotional expressions, by discriminating, categorizing, recognizing and responding to them. Dogs are also known to be able to learn socially. However, using social information is not indiscriminate and being able to choose what to copy and from whom to copy is critical. However, whether domestic dogs are capable of using this sort of information in ecologically relevant settings to solve problems is not yet well understood. Here, we will introduce the existing evidence of the ontogenetic aspects of processing of reputation-like and emotional information by dogs and articulate these concepts and ideas with the underlying mechanisms that must be in place when dogs are experiencing their social world. To do so, we are going to present our recent study on how emotional cues may affect the ability of dogs to learn from an observational social learning task, in which we investigated the potential integration of emotion processing and the use of information during social learning.

### **Characterizing spontaneous rescue behavior towards their owners in domestic dogs**

*Bentosela, M., Dzik, V., Freidin, E., Damián, J.P., Casanave, E. & Carballo, F. <[marianabentosela@gmail.com](mailto:marianabentosela@gmail.com)>*

Rescue behavior refers to a set of pro-social responses that aim to help another individual who is in a stressful or dangerous situation. The main objective is to evaluate if domestic dogs (*Canis familiaris*) are able to rescue their owners when they pretend to be trapped and stressed. Moreover, factors such as previous training, emotional contagion, oxytocin (OT) administration and the level of the dog-owner bond are analyzed. Dogs were assessed in a rescue task in which their owner pretended to be trapped inside a box. In the experimental group he emitted clear signs of stress and called for help, while in the control group he remained calm. The results showed that dogs opened the box more frequently and did it faster in the experimental group, revealing spontaneous rescue behavior. Previous training in search and rescue tasks tended to reduce latencies to open the door. In addition, an increase in heart rate across trials in the stressed group and a decrease in the calm one were observed, but there were no differences in cortisol levels and only few and inconsistent discrepancies in stress-related behaviors between groups. Therefore, the evidence regarding emotional contagion is yet inconclusive. Finally, the administration of intranasal OT decreased the frequency of openings and increased the latency to release the owner and a higher level of bonding appeared to have an additional detrimental effect on the rescue response of dogs who received OT. Future studies are required to clarify the mechanisms involved in dogs' rescue behavior.

### *Cultural Norms in Small-Scale Ecologies*

#### **How are norms maintained and how do they change? A Case Study of Cooperative farming division rules in Derung villages, Yunnan, China**

*Yan, Minhua; Boyd, Robert; Mathew, Sarah <[myan18@asu.edu](mailto:myan18@asu.edu)>*

This research examines how norms are maintained and how they change, a poorly understood phenomenon that is key to explaining human social evolution and contemporary cultural change. Its findings can shed light on how people make decisions in normative contexts, and what factors determine whether and how a norm changes under new social, economic, environmental or political forces. The study focuses on how Derung people, who live in small-scale subsistence societies, divide the surplus from multiple-household cooperative farming. Behaviors and attitudes regarding how the gains should be divided were tracked in two geographically separated Derung villages for three years using semi-structured questionnaires, an ultimatum game experiment, and post-game surveys, and by recording people's daily activities. We found that how to divide the surplus from cooperative farming is an individual decision in one village, but a norm in the other. The norm is to divide equally by household regardless of land or labor contribution or need and is maintained by second-party policing and social learning. Contrary to prevailing theories, normative behaviors are uncoupled from expectations about what behavior others believe is good. The patterning of normative preferences, expectations and behaviors seen in the Derung are not consistent with current explanations of how norms direct behaviors. This suggests that we need to further investigate normative decision-making in different societies to develop empirically-informed theories of norm operation and evolution.

## **The Evolution of Body Adornment: Tattoos and Scarification in Hunter-Gatherer Societies**

*Buckner, William <[wvbuckner@ucdavis.edu](mailto:wvbuckner@ucdavis.edu)>*

The human practice of adorning the body, either through clothing, use of pigments, jewelry, or other decorative materials, appears to be a cross-cultural universal (Antweiler, 2016; Brown, 1991; Murdock, 1945). Noting that a behavior is universal, however, does not necessarily aid us in understanding the causal reasons for its enactment, or the broader social contexts where it occurs. A targeted investigation of a particular type of adornment—decorative scarification and tattooing—across a geographically and culturally diverse sample of hunter-gatherer societies may help improve our understanding of the evolutionary history of body adornment, and its various social functions. Using the Human Relations Area Files (HRAF) World Cultures database, we searched all text under the Outline of Cultural Materials (OCM) identifier “Body alterations”, looking for evidence of intentional scarification practices among the 36 hunter-gatherer societies in the Standard Cross-Cultural Sample (SCCS). Scarification practices were noted to be present for 33 of the 36 societies in our sample (92%), with at least 27 (75%) including the use of pigments ('tattooing'). Aesthetic reasons were the most commonly reported context for scarification (67% of societies), followed by therapy or curing (39%), displaying group identity (25%) and initiation rites (25%). Decorative scarification appears to be cognitively attractive to people across diverse societies for its utility in signaling aspects of social identity and its putative application in curing disease or providing pain relief.

## **He for she? Variation and exaggeration in men's support for women's empowerment in northern Tanzania**

*David W. Lawson, Susan B. Schaffnit, Joseph A. Kilgallen, Yusufu Kumogola, Anthony Galura and Mark Urassa <[dlawson@ucsb.edu](mailto:dlawson@ucsb.edu)>*

Achieving gender equality fundamentally requires a transfer of power from men to women. Yet data on men's support for women's empowerment (WE) remains scant and limited by reliance on self-report methodologies. Here, we examine men's support for WE as a sexual conflict trait, both via direct surveys ( $n = 590$ ) and indirectly by asking men's wives ( $n = 317$ ) to speculate on their husband's views. Data come from a semi-urban community in Mwanza, Tanzania. Attitudinal data was collected spanning topics such as authority in decision-making, intimate partner violence, childrearing, girls' education, women's participation in wage labor, and parental preference for sons vs. daughters. Consistent with reduced resource competition and increased exposure to relatively egalitarian gender norms, higher socioeconomic status predicted greater support for WE. However, potential demographic indicators of sexual conflict (high fertility, polygyny, large spousal age gap) were largely unrelated to men's support for WE. Contrasting self- and wife-reported measures suggests that men frequently exaggerate their support for women in self-reported attitudes. Discrepancies were especially pronounced among men claiming the highest support for WE, but smallest among men who held a professional occupation and whose wife participated in wage

labor, indicating that these factors predict genuine support for WE. We discuss the implications of these results for our understanding of both individual variation and patriarchal gender norms, emphasizing the benefits of greater exchange between the evolutionary human sciences and global health research on these themes.

## ***Sexuality***

### **The relationship between women's menstrual cycle characteristics and sexual motivation**

*Cunningham, Katja; Gassen, Jeff; Mengelkoch, Summer; Hill, Sarah<[katjacunningham@gmail.com](mailto:katjacunningham@gmail.com)>*

Much research finds a link between fertility across the ovulatory cycle and sexual motivation, with women exhibiting a greater desire for sex at times in the cycle when fertility is high. However, to date, no research has examined whether other cycle-based characteristics that are known to be related to fecundity – such as cycle length (a within-cycle predictor of fecundity) and variability (a between-cycle predictor of fecundity) – are related to within- and between- women differences in women's sexual motivation. We examined this possibility using data collected over the course of 12 months from more than 16,000 users of the period tracking app Flo©. Specifically, we tested whether shorter, more regular cycles would predict greater sexual motivation and more sexual activity. Further, consistent with life history models that predict tradeoffs between investment in mating and somatic effort, we predicted that these increases would co-occur with an increase in somatic complaints. Results supported our hypothesis, revealing that women with longer, more variable cycles exhibited lower sexual motivation and engaged in less sexual activity than women with shorter, more regular cycles. Further, within women, longer cycles predicted decreased sexual motivation. Consistent with life history tradeoff models, results also revealed a trade-off between investment in mating effort versus somatic effort. Women with more regular cycles also reported more somatic issues, indicating lower investment in somatic effort, compared to women with more variable cycles. These results indicate that menstrual cycle characteristics known to be predictive of fecundity are related to women's sexual motivation and somatic complaints.

### **Hormonal Contraception and Sexuality: Causal Effects, Unobserved Selection, or Reverse Causality?**

*Laura J. Botzet, Tanja M. Gerlach, Julie C. Driebe, Lars Penke, and Ruben C. Arslan <[botzet@uni-goettingen.de](mailto:botzet@uni-goettingen.de)>*

Female mating behavior is partly regulated by hormones, though many women take hormonal contraceptives that interfere with these evolved endocrine mechanisms. However, scientific evidence of psychological effects of hormonal contraceptives is mixed, partly because causal claims are often based on correlational data. In correlational studies, possible causal effects are difficult to separate from selection effects, attrition effects, and reverse causality. Contraceptive use and, according to the

congruency hypothesis, congruent contraceptive use (whether a woman's current useon-use of hormonal contraceptives is congruent with her useon-use at the time of meeting her partner) have both been thought to influence relationship quality and sexual functioning. In order to address potential issues of (un)observed selection effects in correlational data, we studied a sample of up to 1,179 women to investigate potential effects of contraceptive use and congruent contraceptive use on several measures of relationship quality and sexual functioning. No evidence for substantial effects was found except for a positive effect of hormonal contraceptives on frequency of vaginal intercourse and a negative effect of hormonal contraceptives on frequency of masturbation. These effects were robust to the inclusion of observed confounders, and their sensitivity to unobserved confounders was estimated. No support for the congruency hypothesis was found. Our correlational study was able to disentangle, to some extent, causal effects of hormonal contraceptives from selection effects by estimating the sensitivity of reported effects. To reconcile experimental and observational evidence on hormonal contraceptives, future research should scrutinize the role of unobserved selection effects, attrition effects, and reverse causality.

### **Variation in sociosexuality along sexual orientation continuum: A multi-study from Brazil, Chile, Czechia, and Portugal**

*Valentova, Jaroslava Varella; Medrado, Andreone; Sterbova, Zuzana; Bartova, Klara; Hsu, Rafael; de Moraes, Alexandre Cintra; Fernandez, Ana Maria; Pereira, Marco; Varella, Marco Antonio Correa <[jaroslava@usp.br](mailto:jaroslava@usp.br)>*

Cross-culturally, women report lower tendency to casual sex (sociosexuality) than men, partly because multiple sexual partners can increase reproductive success more in men than in women. However, there is substantial intrasexual variability in sociosexuality. Non-heterosexuals, for exhibiting similar socialization but different reproductive motivations and sex of the partner than heterosexuals, offer a methodological opportunity to further explore the evolutionary proposition. We analyzed how sociosexuality varies along sexual orientation continuum, and test possible differences in sexual orientation patterns between men and women. In four large-sample studies ( $N=15,096$ ) from Brazil and Czechia we tested possible differences in sociosexuality among individuals of different sexual orientations, using slightly different self-report sexual orientation measures. In men, sociosexual behavior (not attitude or desire) increased with non-heterosexuality, while bisexual women showed higher sociosexuality behavior, attitude, and desire than both heterosexual and homosexual women. General sexual desire had no association with sexual orientation in men, while bisexual women showed increased sexual desire. In Study 5 ( $N=1,718$ ) from Brazil, Chile, Portugal, attractions toward men and women were measured independently. In men, attraction toward men was positively predicted by sociosexual behavior, while attraction toward women was negatively predicted by sociosexual behavior. In women, attraction toward women was positively predicted by sociosexuality, while there was no association with attraction toward men. Non-heterosexuality can compose a broader package of non-monogamous sexualeproductive strategies, although differently in men and women. Specifically, sociosexuality and sexual desire in women show more generalized

(bisexual) pattern, while in men sociosexual behavior is influenced by availability of same-sex partners.

## Session 4: Saturday, June 26<sup>th</sup> 1:10pm-2:30pm EDT

*Voice pitch as a signal of individual differences in humans*

### **Who's afraid of Thanos? Sexual selection, honest signaling, and low voice pitch in men**

Aung, Toe; Puts, David <[toea96@gmail.com](mailto:toea96@gmail.com)>

Human voice pitch is perceptually salient and highly sexually differentiated, suggesting the influence of past sexual selection. We consider the evolution of low voice pitch in human males and address competing evolutionary explanations regarding why humans tend to defer to individuals with lower voice pitch. On the one hand, experimentally lowering voice pitch typically has large positive effects on perceptions of size and threat potential in laboratory studies. On the other hand, low voice pitch only modestly predicts components of formidability, including hormonal profiles, size, upper-body strength, and fighting ability, in men. In attempting to resolve this apparent paradox, we hope to clarify the communication of social power.

### **Vocal body size exaggeration in humans: from strategy to efficacy**

Pisanski, Katarzyna; Reby, David <[katarzyna.pisanski@cnrs.fr](mailto:katarzyna.pisanski@cnrs.fr)>

At the heart of animal communication lies an inherent conflict of interest between signalers and receivers: while signalers can benefit by producing signals that manipulate receivers, for instance by exaggerating their true body size or strength, selection also operates on receivers to evade such deception, for example by ignoring deceptive signals or recalibrating their responses. Here, we examine the efficacy of vocal size exaggeration in the human animal. We combine acoustic analysis of vocal signals produced by men and women attempting to sound physically larger or smaller, with a series of psychoacoustic playback experiments on 200 human listeners who judged the heights of these vocalisers, and attempted to discriminate among honest, exaggerated, or attenuated vocal signals of size. Our results address several long-standing questions about the evolution of deception: Is honesty retained in deceptive signals of size? Yes – presumably due to anatomical constraints. Can listeners detect size deception? Yes – over half of deceptive signals are detected. Are listeners still ‘fooled’ by size deception? Partly – although deceptive signals bias listeners’ height judgments, listeners recalibrate their judgments when they correctly identify a signal as deceptive, particularly men judging other men. So, does it still pay vocalisers to exaggerate their size? Yes, because although detection of deception reduces its efficacy, listeners’ height judgements remain biased overall, as deceit often goes undetected. In sum, while size exaggeration can fool listeners, benefiting the deceiver, its detection reduces bias and mitigate costs for listeners, underscoring an unremitting arms-race between signallers and receivers in animal communication.

## **The role of voice pitch in perceived and actual infidelity**

*Schild, Christoph; Stern, Julia; Penke, Lars; Zettler, Ingo<[christoph.schild@uni-siegen.de](mailto:christoph.schild@uni-siegen.de)>*

Picking up on a valid cue to potential infidelity is especially relevant to avoid high fitness costs such as the loss of protection and provisioning as well as parental and relationship investment. We find that when judging a speakers' likelihood to act sexually unfaithful in a committed relationship, listeners rely on the speakers' voice pitch such that a lower voice pitch is perceived as more unfaithful. Importantly, these perceptions are somewhat accurate, as lower mean F0 is indeed linked to a higher probability of self-reported infidelity in both men and women. Methodological shortcomings of the present set of studies and suggestions for future studies are discussed.

## **How voice pitch is related to sociosexuality, dominance, and extraversion**

*Stern, Julia; Schild, Christoph; Jones, Benedict; DeBruine, Lisa; Hahn, Amanda; Puts, David; Zettler, Ingo; Kordsmeyer, Tobias; Feinberg, David; Zamfir, Dan; Penke, Lars; Arslan, Ruben<[julia.stern@psych.uni-goettingen.de](mailto:julia.stern@psych.uni-goettingen.de)>*

When meeting new people, we make spontaneous inferences and form first impressions about a wide range of characteristics. One important factor that drives socially relevant impressions are peoples' voices. Research on links between peoples' traits (e.g. personality traits) and their voices has primarily focused on other peoples' judgments about a target person based on a target person's vocal characteristics, particularly voice pitch. However, it remains unclear whether individual differences in voices are linked to actual individual differences in personality traits, and thus whether vocal characteristics are indeed valid cues to personality. In this Registered Report, we tested the hypotheses that lower voice pitch is related to self-reporting higher dominance, extraversion, sociosexual behavior as well as lower agreeableness. We further tested relationships between voice pitch, formant frequencies and sociosexual desire, attitudes, as well as neuroticism, openness and conscientiousness. For this purpose, we conducted a secondary data analysis of a large sample (2,217 participants) from eleven different, independent datasets from four countries. Results from Bayesian multilevel models suggest substantial negative relationships between voice pitch and self-reported sociosexuality, dominance and extraversion in men and women. Thus, personality might at least partly be expressed in people's voice pitch. Evidence for an association between formant frequencies and self-reported personality traits is not compelling but remains uncertain. Potential underlying biological mechanisms of our effects, such as testosterone levels, or other evolutionary approaches, such as voice pitch as a signal to phenotypic condition will be discussed. Further, a number of implications for future research will be suggested.

## *Cooperation & Morality*

### **Moral disciplining: the cognitive and evolutionary foundations of puritanical morality**

*Fitouchi, Léo; André, Jean-Baptiste; Baumard, Nicolas*<[leo.fitouchi@ens.fr](mailto:leo.fitouchi@ens.fr)>

Presentation type: theoretical and review. Why do many human societies condemn apparently harmless and pleasurable behaviors, such as lust, gluttony, drinking, drugs, gambling, and even music and dance? Why do they erect temperance, self-discipline, hedonic restraint, sobriety, decency and piety as cardinal moral virtues? While existing accounts consider this puritanical morality as an exception to the cooperative function of moral intuitions, we propose that it stems, like other moral concerns, from moral intuitions targeting cooperative challenges. Specifically, we argue that it emerges in response to a key feature of cooperation, namely that the latter is (ultimately) a long-term strategy, requiring (proximately) the self-control of appetites for immediate gratification. Puritanical moralizations condemn and praise behaviors which, although not intrinsically cooperative or uncooperative, are perceived as affecting people's ability to cooperate, by modifying their ability to resist short-term cravings conflicting with cooperative motivations. We review psychological, ethnographic and historical evidence supporting this hypothesis. In particular, drinking, drugs, unruly feasts, dances, and immodest clothing and attitudes are condemned as stimulating people's short-term impulses, thus facilitating uncooperative behaviors (e.g. adultery, violence, economic free-riding). Immoderate indulgence in harmless bodily pleasures (e.g. lust, masturbation, gluttony) is perceived as reinforcing short-term cravings, thus making their self-control harder when they will happen to compete with cooperative requirements. Moralizations of ascetic temperance, daily self-discipline and pious ritual observance are perceived as nurturing the self-restraint consubstantial to a cooperative character, able to resist selfish temptations when the latter arise. We discuss this account's implications regarding the evolution of morality and cross-cultural variations in moral concerns.

### **Modular Morals: The Genetic Architecture of Morality as Cooperation**

*Michael Zakharin; Oliver Scott Curry; Nicholas G. Martin; Gary J. Lewis; Timothy C. Bates* <[s1775682@sms.ed.ac.uk](mailto:s1775682@sms.ed.ac.uk)>

Is morality the product of multiple domain-specific psychological mechanisms, or one more domain-general mechanism? Recent research suggests that morality consists of a range of solutions to the problems of cooperation that are recurrent in human social life. According to the theory of Morality as Cooperation (MAC), there are (at least) seven types of cooperation, that explain seven types of morality: Family, Group, Reciprocity, Heroism, Deference, Fairness and Property Rights. However, it is unclear how these morals are implemented at the psychological level. One possibility is that these morals are the product of multiple domain-specific psychological mechanisms. Another possibility is that they are the product of a single domain-general mechanism, such as 'reason' or 'learning'. Here we use multivariate analysis to determine the genetic and environmental structure of morality, using data collected with the Morality as Cooperation Questionnaire from a representative sample of twins ( $N = 1,066$  pairs). The results support MAC's seven-factor model of morality, and suggest that morality is the product of a combination of seven domain-specific mechanisms and a domain-general

mechanism. We discuss limitations of the current study, and suggest directions for future research.

### **The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe**

*Martins, Mauricio; Baumard, Nicolas*<[mauriciochung@hotmail.com](mailto:mauriciochung@hotmail.com)>

The English and French Revolutions represent a turning point in history, marking the beginning of the modern rise of democracy. Recent advances in cultural evolution have put forward the idea that the early modern revolutions may be the product of a long-term psychological shift, from hierarchical and dominance-based interactions to democratic and trust-based relationships. In this study, we tested this hypothesis by analyzing theatre plays during the early modern period in England and France. We found an increase in cooperation-related words over time relative to dominance-related words in both countries. Furthermore, we found that the accelerated rise of cooperation-related words preceded both the English Civil War (1642) and the French Revolution (1789). Finally, we found that rising per capita GDP (GDPpc) generally led to an increase in cooperation-related words. These results highlight the likely role of long-term psychological and economic changes in explaining the rise of early modern democracies. [Martins & Baumard, The rise of prosociality in fiction preceded democratic revolutions in Early Modern Europe, Proceedings of the National Academy of Sciences Nov 2020, 117 (46) 28684-28691; DOI: 10.1073/pnas.2009571117]

### **Common Knowledge Promotes Cooperation in the Threshold Public Goods Game by Reducing Uncertainty**

*Deutchman, Paul; Amir, Dorsa; Jordan, Matthew; McAuliffe, Katherine* <[deutchma@bc.edu](mailto:deutchma@bc.edu)>

Recent work suggests that an important cognitive mechanism promoting coordination is common knowledge—a heuristic for representing recursive mental states. Yet, we know little about how common knowledge promotes coordination. We propose that common knowledge increases coordination by reducing uncertainty about others' cooperative behavior. We examine how common knowledge increases cooperation in the context of a threshold public goods game, a public good game in which a minimum level of contribution—a threshold—is required. Across two preregistered studies ( $N = 4,111$ ), we explored how varying (1) the information participants had regarding what their group members knew about the threshold and (2) the threshold level affected contributions. We found that participants were more likely to contribute to the public good when there was common knowledge of the threshold than private knowledge. Using structural equation modeling, we found that the predicted number of group members contributing to the public good and certainty about the predicted number of contributors mediated the effect of information condition on contributions. Our results suggest that common knowledge of the threshold increases public good contributions by reducing uncertainty around other people's cooperative behavior. These findings point to the influential role of common knowledge in helping to solve large-scale cooperation problems.

## *Mothers and Fathers: Evolution and Human Parental Investment*

### **Infant mortality is influenced by breastfeeding and male acknowledgment of paternity among U.S. infants**

*Anderson, Kermyt G. <[kganders@ou.edu](mailto:kganders@ou.edu)>*

Infant mortality (death before first birthday) is predicted to be negatively associated with parental investment. This study uses 2011-2015 U.S. birth certificate files, merged with period linked infant mortality data, up to a year following birth, for an analytical sample of 14,827,435 births. Breastfeeding, measured as any breastfeeding at the hospital following birth, occurred for 78.6% of infants. Male commitment to paternal investment is measured by maternal marital status and whether an unmarried man legally acknowledges paternity: couples were either married (69.6%), unmarried with paternity acknowledged (27.7%), or unmarried with paternity not acknowledged (no father on birth certificate) (12.7%). Male commitment to parental care is expected to be highest for married couples and lowest for unmarried men without paternity acknowledgment. Logistic regression modeled infant mortality controlling for maternal sociodemographic factors (age, ethnicity, education, payment method) and birth factors (caesarian, premature, low birthweight, breech, infant sex). Relative to children of married parents, mortality is less likely when the father is unmarried but acknowledges paternity (OR=0.897) and more likely when the father does not acknowledge paternity (OR=1.023), while breastfeeding is associated with reduced mortality risk (OR=.231). There is also a significant interaction between male commitment and breastfeeding: among breastfed infants, odds of mortality are higher among unmarried couples with (OR=1.37) or without (OR=1.76) paternity acknowledgement, relative to married couples. But among children who are not breastfed, risk of mortality is highest among married couples (OR=6.36, compared to married couples who breastfeed) than among unmarried couples with (OR=4.30) or without (OR=4.89) paternity acknowledgement.

### **Infant care and microbiomes**

*Meehan, Courtney L. <[cmeehan@wsu.edu](mailto:cmeehan@wsu.edu)>*

Human infant care is characterized by a set of key ancestral traits which include frequent maternal-infant contact, on-demand breastfeeding, co-sleeping, and cooperative breeding. These ancestral characteristics have supported the development of our highly dependent infants and enabled reproductive success in diverse environments, despite women's narrow reproductive windows and the high energetic costs associated with simultaneously rearing multiple dependent children. Here, I examine whether and how these traits play a role in the formation and development of our microbiomes, which can promote and protect from disease. Utilizing data from multiple studies, including our international multi-site INSPIRE cohort study, I characterize the diverse caregiving worlds of infants and explore how infants' early social environments, maternal and alloparental caregiving, and mothers' life history characteristics are associated with human milk and gastrointestinal microbiomes. I also present results that show evidence of bi-directional maternal-infant microbial transfer

during breastfeeding. Combined, results indicate that the maternal-infant dyad is an integrated biological system, connected via complex communities of microbes, which enable mothers and infants to communicate about their environment and prime the infant for the world in which he or she will be reared.

### **The Cuckoldry Conundrum**

*Scelza, Brooke A. <[bcelza@anthro.ucla.edu](mailto:bcelza@anthro.ucla.edu)>*

The idea that men's reproductive strategies are driven in large part by a desire to maintain paternity certainty underlies major tenets in the evolutionary psychology of mating. When they fail men are said to be the victims of cuckoldry, unwittingly investing in children they did not father. In this talk I will present and challenge two assumptions that are built into standard models of cuckoldry: (1) men are being tricked into investing in non-biological offspring; and (2) investment in non-biological offspring is wasted. Using a range of cross-cultural ethnographic data and a detailed case study based on ten years of fieldwork with Himba pastoralists, I will show that the concepts of pater and genitor are complex and locally constructed ideas that often include explicit knowledge of extra-marital relationships and extra-pair paternity. When this context is considered, we see that paternity losses can be associated with important gains to offset them. Cuckoldry as a concept has limited use in understanding paternity in humans. Future studies should pay close attention to the cultural milieu surrounding fatherhood, rather than assuming men everywhere will be equally driven by the same concerns.

### **Are fathers a good substitute for mothers? Paternal care and growth rates in Shodagor children**

*Starkweather, Kathrine E.; Keith, Monica A.; Prall, Sean P.; Alam, Nurul; Zohora, Fatema tuz; Emery Thompson, Melissa<[kstark20@uic.edu](mailto:kstark20@uic.edu)>*

Biparental care is a hallmark of human social organization, though paternal investment varies between and within societies. The facultative nature of paternal care in humans suggests males should invest when their care improves child survival and/or quality, though testing this prediction can be challenging because of the difficulties of empirically isolating paternal effects from those of other caregivers. Additionally, the broader context in which care is provided, vis a vis care from mothers and others, may lead to different child outcomes. Here, we examine the effects of paternal care on child growth among Shodagor fisher-traders, where fathers provide high levels of both additive and substitutive care, relative to mothers. We modeled seasonal z-scores and velocities for height, weight, and body mass index (BMI) outcomes using linear mixed models. Our evidence indicates that, as predicted, the context of paternal care is an important predictor of child outcomes. Results show that environmental seasonality and alloparental help contribute to a nuanced understanding of the impact of Shodagor paternal care on child physiology.

**Session 5: Saturday, June 26<sup>th</sup> 2:40pm-4:00pm EDT**

## *Aggressive Bargaining & Competition*

### **Testing the etiology of mean sex differences in aggression using a genetic factor model**

*Richardson, George; Boutwell, Brian; Wing-Yee Tse, Winnie; Lai, Mark H.  
C. <[george.richardson@uc.edu](mailto:george.richardson@uc.edu)>*

Decades of research using western and non-western samples of developing and developed societies has revealed several consistent findings related to various human behaviors. Chief among them in terms of replicability has been a mean sex difference in aggression and violence. Males seem to universally outpace females across measures of physical aggression, violence, and other externalizing outcomes. Scholars have proposed many factors—biological, psychological, sociological, historical, and cultural—which likely all play some role in explaining the gap. Here, we use a national sample of American twins and a unique modeling strategy in quantitative genetics to determine the sources of mean sex differences in trait aggression. Using a multigroup genetic factor model with a mean structure, our results provide no evidence of sex differences in covariance structure and suggest that genetic and nonshared environmental influences common to both sexes largely explain why males are more aggressive, on average, than are females. In contrast, shared environmental influences seem to play a less important role. We discuss our findings in the context of evolutionary and sociocultural theories, as well as chart out directions for future research.

### **Reversing the gender gap: Women prefer a greater number of competitions than men**

*Schell, Tiffany; Apicella, Coren; Mollerstrom, Johanna<[tschell@sas.upenn.edu](mailto:tschell@sas.upenn.edu)>*

Despite efforts to realize gender equality over the past few decades, the wage gap and underrepresentation of women in top positions remain nearly universal. Evolved gender differences in competitiveness have been proposed as an explanatory factor. When given the choice between piece-rate payment schemes based on individual performance versus tournament schemes with payment contingent on outperforming an opponent, women are less likely than equally-able men to compete, thus losing out on earnings and opportunities. This gender difference is partly explained by women's greater reluctance to take risks – tournaments are riskier since they have a greater variance in returns. Here, we test whether altering the level of risk inherent in competitions can persuade women to engage in a greater number of competitions compared to men. We provide 602 (48% female) participants recruited from an online marketplace with the option to compete in either multiple, low-stakes math tournaments (low-risk option) or a single, high-stakes math tournament (high-risk option). Total possible earnings and length of time were identical for both options. More women (56%) than men (41%) chose the multiple tournaments option ( $p < .001$ ). Risk-aversion positively predicted the preference for multiple tournaments, but the gender difference in choice remained after controlling for demographic and psychological variables, including attitudes to risk. Promotion practices at firms are often structured around competition

because they boost employee performance. Importantly, both options similarly enhanced performance. Our findings suggest that offering multiple, smaller competitions in place of fewer large competitions may encourage women to compete more without sacrificing employee output.

**Intersexual and intrasexual selection for neck musculature in men:  
Attractiveness, dominance, and actual fighting success.**

Caton, Neil R.; Lewis, David M. G. <[neilcaton2@gmail.com](mailto:neilcaton2@gmail.com)>

Almost one-hundred and fifty years ago, Darwin (1872) stated that “animals of all kinds... have exerted their utmost powers in fighting and in defending themselves.” Since then, no research has empirically linked human morphological structures to damage reduction in real-world fights. Human neck musculature is here argued to be one such morphological structure designed to reduce incoming damage, but also assist damage output, in violent fights. Study 1 demonstrated that larger neck musculature (using geometric morphometric analyses) in UFC combatants ( $N = 715$ ) was associated with greater fighting success ( $p = .002$ ), knockout resistance ( $p < .001$ ), and knockout power ( $p < .001$ ) after controlling for the relevant confounding variables (e.g., height, weight, age). Drawing on data from United States army personnel, Study 2 ( $N = 4,082$  men; 1,986 women) showed that neck circumference was the most sexually dimorphic anatomical feature ( $r = -.80$ ; men had greater neck circumference) when compared to 93 other anatomical structures. Study 3 showed that men ( $N = 44$ ) with physiologically stronger necks were perceived as stronger fighters (after controlling for relevant confounds; e.g., height, weight, bodily strength). Study 4 ( $N = 178$ ) manipulated photorealistic images, and showed that men with larger sternocleidomastoid and upper trapezius muscles were perceived as more dominant (i.e., strong, masculine, anger-prone, and aggressive) and attractive (i.e., short and long-term attractiveness). These results provide comprehensive support for the hypothesis that human neck musculature evolved to increase resource-holding potential, and that humans’ psychological systems consequently evolved to attend to this morphological structure.

**The Face of a Leader: combining behavioral experiments with geometric morphometrics**

Rostovtseva Victoria, Mezentseva Anna, Windhager Sonja, Butovskaya Marina <[victoria.v.rostovtseva@gmail.com](mailto:victoria.v.rostovtseva@gmail.com)>

Here we report on the results of an experimental study investigating association between facial morphology and individual leadership potential of young men. Many studies up to date have focused on the investigation of the facial cues related to perception of leadership ability. However, little has been done so far to examine, which facial traits are associated with actual (not perceived) individual leadership potential. Participants of our experiment were male Buryats – people of Mongolian origin ( $N=98$ ), living in Southern Siberia, and aged  $20 \pm 2$  years. Individual leadership potential was measured in a group cooperation task (Public Goods Game) played “face-to-face” under condition of verbal negotiations between participants. All participants were also photographed in full face with a neutral facial expression. Using geometric

morphometrics, we have analyzed facial shapes of leaders and non-leaders, and have revealed significant differences between them. To specify exact facial areas, where the differences occurred, and to assess significance of each area's contribution to the observed differences, we have analyzed standard anthropometric facial parameters of specific facial areas (approximations to the craniofacial landmarks and soft-tissues) for leaders and non-leaders. Obtained results were compared to the results of our previous study measuring sexual dimorphism in facial shapes of the same subjects (including also a female sample). Results of the comparison allowed estimating an impact of general masculinization on the formation of the specific facial traits, which were characteristic of emergent leaders. The presentation includes visualizations and quantitative estimates. The study was supported by Russian Science Foundation (project 18-18-00075).

### *Challenging Some Big Assumptions*

#### **Computational services and encephalization in Homo**

*Hagen, Edward H.; Garfield, Zachary H.; Lightner, Aaron D.*<[edhagen@wsu.edu](mailto:edhagen@wsu.edu)>

Brain size in Homo tripled during the Pleistocene, an increase whose fitness benefits are poorly understood. Drawing on extensive analyses of the ethnographic record, fieldwork in two nonindustrial African societies, and an analogy with cloud-based computing, we develop a new computational services model to help explain human encephalization. It has long been recognized that those who are perceived to be knowledgeable and intelligent gain prestige, are attractive as mates, and often ascend to leadership roles. Mentoring and mate attraction theories do not adequately account for this combination of traits. Analyses of 1212 ethnographic texts from 59 nonindustrial societies determined that leaders are universally perceived to be intelligent and knowledgeable, resolve conflicts, and receive material and reproductive benefits. Fieldwork among the Chabu, forager-horticulturalists in southwest Ethiopia, similarly found that, compared to non-leaders, leaders were highly rated on knowledge and intelligence ( $d=2.6$ ). Analyses of 547 ethnographic texts found extensive cross-cultural evidence for knowledge specialists, some of whom served as mentors but many of whom provided services, such as medical advice, in exchange for various types of payment, a pattern confirmed in ethnographic work among the Maasai. Numerous companies with extensive but underutilized computational infrastructure maximize profits by also providing computational services to others for a fee. We propose that humans similarly evolved to maximize the benefits from our energetically expensive brains by utilizing surplus cognitive capacity to provide medical advice, mentoring, decision-making, conflict resolution, and other computational services to group members in exchange for various types of fitness benefits.

#### **Why evolutionary psychology should abandon modularity, part II: The alternative framework**

*Pietraszewski, David; Wertz, Annie* <[pietraszewski@mpib-berlin.mpg.de](mailto:pietraszewski@mpib-berlin.mpg.de)>

In a previous HBES talk (2017), we (i) deconstructed the hidden argument lurking within Fodorian modularity—that modules are the parts of the mind that are distinct from the homunculus—and (ii) showed how projecting this argument onto evolutionary psychology has wreaked havoc on our science and provided ready ammunition for facile dismissals of EP. In this talk, we will present an alternative framework for understanding modularity and the confusions surrounding this concept. This framework not only explains why Fodor's version of modularity is so frequently attributed to EP, it also provides a clearer way to articulate evolutionary psychology's claims about the mind to outside audiences. This framework—which describes the level of reduction (or analysis) at which one is describing the mind—will not only inoculate evolutionary psychology from a large number of highly-infectious misunderstandings, it will put evolutionary psychology in the vanguard, as confusions between different levels of analysis, we will argue, are currently endemic throughout the psychological and behavioral sciences.

### **Sexual Violence Against Women: The Most Widespread Human Rights Violation in the World**

*Buss, David <[dbuss@austin.utexas.edu](mailto:dbuss@austin.utexas.edu)>*

Sexual violence against women bypasses freedom of sexual choice, the most widespread human rights violation in the world. It occurs in all cultures and among all ethnic groups, transcending religious, political, social, and economic circumstances. Although estimates vary, roughly 19% of high school girls become victims of stalking, 17– 23% of college women suffer rape or attempted rape, 30% experience intimate partner violence, and 59% experience sexual harassment. Identifying the underlying causes of its many forms is critical to discovering effective cures. Fundamental roots can be traced to sex differences in evolved sexual psychology, individual differences in sexual strategy, vulnerability of victims, and modern environments that facilitate or inhibit dark deeds. Causal elements include sexual misperception biases, the desire for sexual variety, sexual arousal to visual cues, arousal-contingent shifts in willingness to sexually coerce, sexual entitlement linked with status and power, Dark Triad traits, short-term mating strategy, and mind-reading errors produced by using introspection about one's own sexual psychology to infer the sexual psychology of others. Education about causal conditions is critical to amelioration. When it comes to sexual violence, denying sex differences in sexual psychology is damaging to precisely the half of the population most likely to be victimized.

### **On hits and being hit on: error management theory, signal detection theory, and the male sexual overperception bias**

*Brandner, Jordann L.; Pohlman, Jadyn; Brase, Gary L.<[jordannbrandner@ksu.edu](mailto:jordannbrandner@ksu.edu)>*

Although Error Management Theory (EMT) can explain male sexual overperception, more advanced Signal Detection Theory (SDT) analyses can identify sensitivity and bias separately. In Study 1 ( $N = 85$ ), undergraduate participants evaluated 75 pre-rated, unambiguous vignettes for whether they communicated sexual interest or disinterest. An SDT analysis of perceptions found that sensitivity to sexual interest/disinterest

signals drove participants' perceptions, rather than an overall bias to perceive sexual interest. Cues of interest were generally underperceived, while sensitivity and accuracy were uniformly high. EMT analysis also found overall sexual interest underperception, but with men slightly overperceiving interest relative to women. These discrepant results were due to EMT using difference scores, which obscure baseline perceptions for men and women. Individual differences in life history strategy, mating strategy, and mate value did not affect sensitivity or bias. Study 2 largely replicated these results using 50 trials of more ambivalent scenarios and an online participant pool ( $N = 271$ ), except EMT analyses found men's misperception to be significantly larger than women's, despite being closer to pre-rated communication levels. These results show that sexual communication may be more nuanced than previously thought, and that an SDT analysis is more appropriate for such data.

### *From Chaos to Clarity in Life History Theory: New Data and New Directions*

#### **The development of life history strategies: Open questions and new directions**

*Del Giudice, Marco <[marcodg@unm.edu](mailto:marcodg@unm.edu)>*

The idea that early environmental cues shape the development of individual life history strategies has become a central theme in evolutionary-developmental psychology, motivating an impressive amount of empirical research. However, theoretical progress in this area has significantly lagged behind, and the field has yet to confront some crucial questions regarding the relation between the population and individual level of analysis; the evolution developmental plasticity in ecologically realistic scenarios; the sensitivity of life history trade-offs to individual quality and resources; the interplay between genetic and environmental factors; and the functional logic of the mechanisms that coordinate the expression of life history-related traits at the phenotypic level. In this talk I offer a survey of open questions for life history-inspired developmental research, summarize the state of the art, and suggest new approaches to help researchers in their search for compelling answers.

#### **Can ecologically-relevant stimuli improve cognitive performance for children living in adversity?**

*Young, Ethan; Frankenhuys, Willem; Ellis, Bruce<[young.ethan.scott@gmail.com](mailto:young.ethan.scott@gmail.com)>*

Children living in harsh conditions tend to perform poorly on cognitive tests. However, there is growing interest in the hidden talents approach, which proposes that some abilities may be enhanced by adversity, especially those that are ecologically relevant to lived experience. The approach suggests the performance of adversity-exposed youth might improve under more ecologically relevant conditions. Here, we evaluate the role of ecologically relevant content in cognitive testing. To do so, we sampled 618 adolescents from a socioeconomically diverse population. Using interviews, self-reports, and school records we measured exposure to environmental unpredictability, violence, and poverty. We then tested performance on two widely used tasks: attention shifting and working memory updating. There were two versions of each task. The first used

standard abstract stimuli and the second replaced standard stimuli with more ecologically relevant stimuli. We then tested the interactive effect of adversity and abstract vs ecological stimuli using a multiverse analysis approach. Overall, we found lowered performance among violence- and poverty-exposed youth on the abstract working memory updating task. However, under specific analytic decisions, ecological content produced an equalization effect: the updating performance gap between low and high-adversity exposed youth narrowed on the ecological updating task. Updating performance was unrelated to unpredictability and we found no interaction effects for attention shifting. This pattern of results is striking compared with the backdrop of developmental science, which almost exclusively reports lowered cognitive performance in people from harsh conditions.

### **The Role of Childhood Unpredictability in Adult Health: A Life History Approach**

*Maner, Jon K.; Hasty, Connor R.; Morabito, Danielle; Schmidt, Norman B.; Martinez, Jose L.; Gerend, Mary A.<[maner@psy.fsu.edu](mailto:maner@psy.fsu.edu)>*

Theories of adaptive calibration (e.g., life history theory) provide an overarching conceptual framework for identifying ecological factors that affect individual development throughout the lifespan. This research focused on the role of childhood unpredictability (the extent to which early childhood is characterized by uncertainty or instability) to identify its role in adult mental and physical health. In doing so, we differentiated effects of childhood unpredictability from effects of other relevant ecological constructs including resource scarcity in childhood (a measure of ecological "harshness"), adverse child experiences, and childhood and adult socioeconomic status. Across two studies, adult participants (total n=1198) retrospectively described features of their childhood environments (e.g., unpredictability, financial hardship, adverse child experiences), and reported on their current mental and physical health using a range of well-validated measures. Above and beyond other childhood variables and demographic characteristics, high levels of childhood unpredictability were associated with worse adult health including lower health-related quality of life, worse social, emotional, and physical functioning, greater pain and disability, and higher levels of psychopathology. Experiencing childhood environments that are uncertain, unstable, or uncontrollable may put children on a path toward poor health in adulthood. These results fit with evolutionary models of adaptive calibration and provide new insight into the links between childhood experiences and adult health.

### **Life History in Psychology Literature: Making sense of many conceptualizations and operationalizations**

*Maranges, Heather <[heather.maranges@concordia.ca](mailto:heather.maranges@concordia.ca)>*

Life history theory and behavioral ecological frameworks have facilitated essential insights into humans' adaptive calibration to their (usually developmental) environment and have inspired psychological research in domains as far-reaching as personality, health, cognition, sexuality, close relationships, and morality. Much of this work has focused on downstream effects of early developmental ecological factors, particularly harshness (i.e., average morbidity/mortality) and unpredictability (i.e., stochastic

changes/variation in morbidity/mortality). However, big picture conclusions about adaptive calibration based on this body of work are limited for two reasons: Harshness and unpredictability have not only been conceptually and operationally conflated in the past but, more recently, also have been conceptualized and operationalized in so many different ways that comparisons within harshness or unpredictability are difficult. Accordingly, to exact some order, I proffer a survey of the literature in psychology to map out different and similar conceptualizations, operationalizations, and downstream consequences of harshness and unpredictability. As an example, consider just some of the various ways harshness has been operationalized: violence, low subjective SES, low objective SES, parental stress, child stress, neighborhood crime, abuse, trauma, deprivation, parenting style, and crop yield. I organize these conceptualizations and operationalizations with the goal of answering some important questions: Do different types of harshness (unpredictability) have different effects? Are harshness and unpredictability dissociable? Is it appropriate to characterize adaptive calibration to the ecology as clusters falling on a fast to slow continuum? Do objective or subjective ecological factors matter more? In what domains or contexts are there sex differences in calibration?

## Session 6: Monday, June 28<sup>th</sup> 7:10pm-8:30pm EDT

### *Choosing Cooperative Partners*

**Reciprocity is calibrated by real-world priors, even in the lab: People reciprocate more and punish less when they believe people in their real-life social environment can easily switch partners**

Arai, Sakura; Cosmides, Leda; Tooby, John<[sakura.arai@psych.ucsb.edu](mailto:sakura.arai@psych.ucsb.edu)>

Early evolutionary models of reciprocal cooperation demonstrate that situations in which an individual repeatedly interacts with the same partner select for strategies to retaliate against defection (e.g., Axelrod & Hamilton, 1981). Later models permitting agents to freely choose partners favor strategies that switch to more cooperative partners rather than waste resources in retaliation (e.g., Yamagishi et al., 1994). Realistically, however, most human environments are intermediate between these two extremes. Thus, selection should favor mechanisms to estimate the degree to which the current environment allows partner switching to calibrate motivations to retaliate. We tested whether a newly-available cue about the environment influences how much people retaliate against—punish—partners who failed to reciprocate. In one condition, we let participants freely switch partners in a Trust Game with Punishment, but not in another condition. To gauge participants' prior estimates of how much their average environments allow partner switching, we used a Relational Mobility scale (Yuki et al., 2007). This measures beliefs about other people's outside options in one's real-world social environment. We recruited participants online from two societies whose Relational Mobility differs (519 Americans and 520 Japanese). Multiple regressions revealed no main effect of conditions. However, across conditions and societies, participants' prior estimates decreased punishment ( $\beta = -.18$ ): i.e., those who thought

that their partners were more likely to leave punished less. Participants similarly calibrated reciprocity to partners' trust ( $\beta = .27$ ), a functional strategy for encouraging good partners to stay. Estimates of one's social environment regulate reciprocity, even in the lab.

### **Honest signaling of cooperative intentions**

*Gilbert Roberts <[gilbert.roberts@yahoo.co.uk](mailto:gilbert.roberts@yahoo.co.uk)>*

How can we honestly signal cooperative intentions or 'trustworthiness'? This could be decisive in persuading others to trust us; and conversely in deciding who to trust. I investigated this using a simple computer model in which individuals were assigned roles as 'competitors' and 'selectors' and made a series of decisions. 'Competitors' for a partner either invested in a reputation by performing a costly helpful behaviour ('signaling'), or did not signal. 'Selectors' then either chose a partner based on whether they had signaled, or ignored this information. They each either cooperated or defected in a repeated game with their partner. Using computer simulation, I showed that strategies of signaling by helping others; of using these signals in partner choice; and of cooperating with the chosen partner all invaded uncooperative populations. Costly help evolved into an honest signal of trustworthiness when it was adaptive for cooperators, relative to defectors, to invest in the long-term benefits of a reputation for helping. This occurred where the signal was too expensive for an individual that was just going to defect (thereby ending the interaction) but could be a strategic investment by a cooperator benefitting from repeat interactions. Most costly signalling models focus on how the signal discriminates high quality individuals (classically, the peacock's train). In this model, individuals differ in strategy rather than quality, and those in it for long-term cooperation pay the signal costs. This honest signalling of trustworthiness could help explain a range of phenomena from courtship gifts to philanthropy.

### **Tracking opportunities to develop cooperative relationships with needy others**

*M. Danielle Grant, Eric J. Pedersen, Michael McCullough<[magr1950@colorado.edu](mailto:magr1950@colorado.edu)>*

Previous work suggests that humans are acutely attuned to categorizing other individuals based on existing cooperative relationships (Pietraszewski, Cosmides, & Tooby, 2014). Further, humans likely also possess the ability to preferentially track opportunities to spark new cooperative relationships. One cue that can be used to track prospective cooperative partners is the expression of need. Recognizing and subsequently helping another person in need can provide a variety of benefits to a benefactor, such as gaining an additional person invested in the benefactor's welfare and signaling generosity to other partner prospects (Barclay, 2013). In a 2(gender: male, female) by 4(statement: platitude, personal need, abstract need, Covid-19 personal need) experiment, we use the "who said what?" paradigm to test whether subjects (N = 311) categorized strangers based on expressions of need. We measured the number of between-category and within-category mistakes made by subjects to test strength of categorization by need statements. We did not find differences in strength of categorization for personal-need vs. abstract-need or personal-need vs. platitude conditions, but we did find significant differences in between and within-statement

mistakes for Covid-19 need vs. platitude ( $p < .001$ ) and abstract-need vs. platitude ( $p = .048$ ) conditions. Hence, relative to targets who spoke about platitudes, subjects more strongly categorized targets who spoke about personal-needs related to Covid-19 as well as abstract-needs. Given the widespread shared experience of Covid-19, these results suggest that empathy and perspective-taking may contribute to cognitive investment in tracking opportunities for cooperative relationships. A replication is in progress.

### **Chimpanzees seek help, but not strategically**

*Hanna Schleihauf, Esther Herrmann, Julia Fischer, & Jan Engelmann <[schleihauf@berkeley.edu](mailto:schleihauf@berkeley.edu)>*

Seeking help can be a highly adaptive behavior. From an evolutionary perspective, strategic help-seeking can significantly improve an individual's fitness. However, it has not yet been investigated whether our closest relatives –chimpanzees– seek help strategically. In Study 1, we investigated whether chimpanzees seek help selectively when they need it. Chimpanzees ( $N=19$ ) sought help when it was necessary, but not if they could solve the problem themselves ( $c2(1)=30.821$ ,  $p<.001$ ). In Study 2, we investigated whether chimpanzees seek help strategically: Do they consider action-related costs of potential helpers as much as they consider their own? Chimpanzees ( $N=14$ ) had a stronger preference for a low-cost option when they had to obtain a reward on their own, but not when they sought help from others ( $c2(1)=7.989$ ,  $p=.005$ ). These findings imply that chimpanzees seek help when they need it, but they do not strategically consider other's costs when deciding whom to seek help from.

### *Inaccurate Beliefs: Origins and Consequences*

#### **The mind's meta-data: Cognitive adaptations for monitoring the source of misleading communication**

*Mermelstein, Spencer; Barlev, Michael; German, Tamsin C.<[mermelstein@psych.ucsb.edu](mailto:mermelstein@psych.ucsb.edu)>*

Communication is central to our species success, from facilitating collective action to supercharging cumulative cultural evolution. Yet across human evolutionary history and to the present day, communication carries with it the threat of misinformation and manipulation. For communication to remain adaptive, theorists propose that the mind contains a suite of mechanisms for evaluating speakers and their messages. Here, I present 5 experiments investigating a key function hypothesized of these “epistemic vigilance” adaptations: Selective memory for links between speakers and messages that are inconsistent with prior beliefs. In these studies, participants (US undergraduates,  $N = 999$ ) read a series of stories associated with different sources and each containing counterintuitive (which violate prior beliefs) and ordinary concepts. As predicted, participants in Exp. 1 more accurately attributed counterintuitive versus ordinary concepts to their speakers. Exp. 2 and 3 replicated this finding and found that it extended to counterintuitive concepts associated with particular places and dates. Exp.

4 then investigated the relative strength of these links over time, finding that links between counterintuitive concepts and speakers were differentially durable. Last, Exp. 5 explored the specificity of these mechanisms. A memory advantage was again found for links between counterintuitive concepts and persons, but only when the messages were framed as told by others and not when told to others. Together, the results suggest the mind selectively tags misleading messages with meta-data, enabling the ongoing evaluation of its source and content. Implications for communication and the representation of counterintuitive concepts in science and religion are discussed.

### **Fear of contamination and public opinion on nuclear energy**

*Hacquin, Anne-Sophie; Altay, Sacha; Aarøe, Lene; Mercier, Hugo<[as.hacquin@gmail.com](mailto:as.hacquin@gmail.com)>*

An increasing number of experts agree that nuclear power should be part of the solution to fight climate change as it emits little greenhouse gases, has had no negative health consequences during normal operation, and even limited consequences after accidents. However, in many countries the population is much more ambivalent about nuclear power, and tends to exaggerate the negative effects on health and the environment. We suggest that this gap between experts and the public stems in part from nuclear power triggering the behavioral immune system: a set of cognitive adaptations that aim at protecting us against pathogens by making us particularly alert to their existence, and attuned to their risks. In line with this suggestion, we find that (i) participants overestimate the risks of nuclear accidents compared to other types of disasters (Exp1), except for disasters that should also trigger the behavioral immune system (Exp2); (ii) participants were more interested in reading and sharing a news article about a nuclear accident than about other types of accidents (with the same exception, Exp2); (iii) participants were less willing to be in contact with an object that had been in a nuclear power plant than in a car manufacturing plant (Exp3); (iv) arguments showing that nuclear power plants should not elicit fears of contamination reduced the negative perception of nuclear energy (Exp4). This work suggests a cognitive basis for the popular rejection of nuclear power, and ways to bridge the gap between experts and the public on this topic.

### **Happy Thoughts: The Role of Communion in Accepting and Sharing Epistemically Suspect Beliefs**

*Sacha Altay, Yoshimasa Majima, Hugo Mercier<[sacha.altay@gmail.com](mailto:sacha.altay@gmail.com)>*

Why are some epistemically suspect beliefs so popular? People high in communion, either because they want to make others happy, or because they want to display their niceness, might be particularly keen to share ‘happy thoughts,’ beliefs that might make others happy, even if they are epistemically suspect—for instance, that naturopathy works, or that heaven exists. Across six experiments (N = 1596, U.K.) we found that: (i) people who self-describe as being high on communion (i.e., nice, kind) are more likely to believe and share happier epistemically suspect beliefs, by contrast with people who self-describes as being high on agency (i.e., competent, dominant); (ii) people prefer to share happier beliefs when wishing to appear nice and kind rather than competent and

dominant; (iii) sharing happier beliefs does lead to being perceived as nicer and kinder; and (iv) sharing happier beliefs leads to being perceived as less dominant. We also found a consistent positive bias independent of participants' personality, with happier beliefs being more likely to be shared and believed. We replicated these results with Japanese participants. Overall, these results suggest that some happy epistemically suspect beliefs could become culturally successful because they allow their sender to signal niceness and kindness.

### **Ignorant armies clash by night: Massive scale mismatch, unseen nonlocal consequence multiplicity, and the universal failure to understand the consequences of our own politics**

*John Tooby <[tooby@anth.ucsb.edu](mailto:tooby@anth.ucsb.edu)>*

Why do people care, sometimes intensely, about distant events happening to strangers? Why are single deaths a tragedy, while a million deaths are a statistic? Obviously, the human machinery of understanding evolved to represent situations as happening inside one's own local (ancestral forager group-scaled) arena of interaction. Moreover, our adaptations evolved to assign significance to events in terms of the evolved meanings those events (and our responsive choices) would have had in this hyper-reduced ancestral world. Our responses only had predictable consequences that were local, so there would have been no selection on our evolved architectures to weight extralocal ramifications. Our minds are neither designed to anticipate nor weight how the generalization of our responsive political policy preferences ("defunding the police"; "war on terror") would actually play out in their application to an unimaginable multiplicity and diversity of billions of subsequent events. Would we support them if we had the capacity to represent their ramifications with the same vividly weighted intensity as the initiating individual event? Hypothetically, we would also need the missing capacity to integrate these ramifications in a way that represents their aggregated effects on welfare quantitatively. Each event would only be included proportionately, without allowing Stalin's single tragically felt death to trump a million deaths—unfelt because they are beyond the horizon of the political group's often strategically manipulated joint attention. Using our native adaptations, the politically active and lawmakers alike cannot see—and often do not want to see—how invisible billions actually experience their policies.

### *The Adaptive Nature of Bullying*

#### **Adaptive Developmental Links Between the Dark Triad and Bullying**

*Davis, Adam; Farrell, Ann; Britain, Heather; Krygsman, Amanda; Arnocky, Steven; Vaillancourt, Tracy <[adavi154@uottawa.ca](mailto:adavi154@uottawa.ca)>*

The Dark Triad (DT) of narcissism, Machiavellianism, and psychopathy may function to promote the execution of opportunistic and exploitative social and reproductive strategies throughout development. Bullying may constitute one such strategy that facilitates the accrual of dominance and popularity, as well as dating and sexual partners in youth.

Few researchers have studied the longitudinal associations between the DT and bullying in youth. To our knowledge, no scholars have examined these relations over time using analytic techniques that allow for the separation of between- and within-person variability. This is important given the call for more “person-centered” research in light of evidence that the DT do not co-occur equally within individuals. To address these gaps, we used random intercept cross-lagged panel modeling with three waves of data from a randomized sample of 514 Canadian adolescents (56.8%, n = 292 girls) from ages 15 to 17 years (Mwave 1 = 16.00, SD = 0.34). Controlling for gender, at the inter-personal level, only the random intercept for psychopathy correlated positively with bullying. At the intra-personal level, significant within-person stability was found for narcissism and Machiavellianism. Within-time correlations largely mirrored inter-personal bivariate associations, indicating that psychopathy shared the strongest links with bullying. Significant within-person cross-lagged effects were found for both disposition- and perpetration-driven pathways, signalling reciprocal relations among the DT dimensions and bullying. Results supported differential relations between the DT and bullying in youth, and suggest that it is problematic to assume that “dark” dispositions promote bullying, while not considering alternative pathways.

### **Long-term Personality, Social, and Behavioral Trade-Offs of Childhood Bullying Perpetration**

*Farrell, Ann; Vaillancourt, Tracy <[afarrel2@uottawa.ca](mailto:afarrel2@uottawa.ca)>*

Bullying is often used by children and adolescents higher on antisocial personality traits to adaptively obtain social benefits such as popularity and social status. However, the extent to which these strategies come at long-term costs to social relationships during adulthood are unknown. Accordingly, latent class growth trajectories of childhood bullying perpetration across ages 10 to 18 were examined in the prediction of trajectories of adulthood outcomes across ages 19 to 23 (interpersonal relations, indirect aggression, psychopathy). In a sample of 701 participants (52.9% girls/women) followed annually, two latent growth trajectory groups were found for childhood bullying perpetration; a low stable group (81.2%) and a moderate increasing group (18.8%). In adulthood, three trajectory groups were found; a below average antisocial group (21.6%; low interpersonal relations, low indirect aggression, low psychopathy), an above average antisocial group (16.8%; low interpersonal relations, high indirect aggression, high psychopathy), and a prosocial group (61.6%; high interpersonal relations only). Individuals following the moderate increasing bullying trajectory had significantly higher odds of following the above average antisocial trajectory, but not the prosocial trajectory (compared to the below average antisocial group). Findings indicate that childhood bullying predicts the continuity of aggression and antisocial personality in adulthood potentially due to some of their adaptive functions, but can come at the cost to the quality of interpersonal relationships.

### **Mating, Parental, and Somatic Investment of Adults Who Bullied as Adolescents**

*Brazil, Kristopher; Volk, Anthony <[kb15hr@brocku.ca](mailto:kb15hr@brocku.ca)>*

Bullying is a behavior that peaks in adolescents but continues to influence perpetrators and victims well into adulthood. An adaptive approach to bullying has revealed that adolescents engaging in bullying perpetration have more dating and sexual opportunities. The extent to which this mating effort extends into adulthood is unknown. Furthermore, although bullying has been linked to mating success, less research has examined its links to parental and somatic effort into early adulthood (when important investment decisions tend to be made). The present study used an online community sample of 516 young adults aged 25-35 (50% female). We explored behavior and attitudes underlying short-term mating, parental, and somatic effort and how each of these relates to retrospective bullying (regression 1) and victimization (regression 2). Results of regression 1 showed that bullying was associated with being male and higher short-term mating, parental, and somatic behavior and lower parental attitudes while controlling for victimization. Results of regression 2 showed that victimization was associated with being female and lower short-term mating attitudes while controlling for bullying perpetration. The results suggest that young adults who report being bullies in adolescence engage in behavior that facilitates higher reproductive effort, including greater mating, parental, and somatic behavior, but they have negative attitudes toward parental (and potentially somatic) effort. Those who reported more victimization, however, only had negative attitudes toward short-term mating. Our findings provide further support that bullying may be an adaptive behavior that has effects into early adulthood.

### **The role of social comparison and envy in motivating women's intrasexual aggression**

*Arnocky, Steven <[stevena@nipissingu.ca](mailto:stevena@nipissingu.ca)>*

Physical attractiveness is a central component of female mate value. However, the extent to which women possess attractive physical traits varies between individuals, placing less attractive women at a mating disadvantage. Researchers have suggested that envy may have evolved as an emotion that promotes compensatory intrasexual competition in response to unfavorable social comparisons on important mate-value traits, such as physical attractiveness. Previous research has shown that envy mediates links between unfavorable appearance comparisons and women's intended appearance-enhancement behavior. In the current research, we extended this framework to examine the link between upward appearance comparisons and women's intrasexual aggression. In a sample of undergraduate women, results showed that upward physical appearance comparison predicted scores on the Buss-Perry Aggression Questionnaire short form, as well as a measure of indirect (i.e., social) aggression, with envy fully mediating these links. A second study extended this model to test intrasexual gossip as an additional putative index of female intrasexual competition. Envy mediated the link between upward physical appearance comparison and gossip. These results support the hypothesis that envy is an adaptation that promotes compensatory intrasexual competition in light of unfavorable social comparisons on important mate value traits.

Session 7: Monday, June 28<sup>th</sup> 8:40pm-10:00pm EDT

## *Pathogens & Threat Perception*

### **Pathogen disgust sensitivity protects against infection and is calibrated to local socio-ecological conditions in a high pathogen environment**

*Sugiyama, Lawerence S.; Cepon-Robins, Tara J.; Blackwell, Aaron D.; Gildner, Theresa E.; Liebert, Melissa A; Urlacher, Samuel S.; Madimenos, Felicia C.; Eick, Geeta N.; Snodgrass, J. Josh<[sugiyama@uoregon.edu](mailto:sugiyama@uoregon.edu)>*

Disgust is hypothesized to function to regulate exposure to pathogen-related fitness-reducing stimuli and behaviors. Individuals with higher pathogen disgust sensitivity (PDS) are thus predicted to be exposed to fewer pathogens and have lower pathogen burdens, yet this core prediction had not been previously been tested directly. Further, to function adaptively, PDS must be calibrated to cues of the local socio-ecological costs/benefit structure of infection/avoidance. Market integration is associated with factors affecting the costs of avoidance through sanitation, and other lifestyle factors. We therefore collected data on PDS and biomarkers of infection among 75 participants (ages 5 to 59 years) from 28 households in three Ecuadorian Shuar communities characterized by subsistence-based lifestyles and high pathogen burden. As predicted, we find strong negative associations between PDS and biomarkers of immune response to viral/bacterial infection, and weaker associations between PDS and measures of macroparasite infection that appear mediated by market integration-related and socio-ecological differences, at the individual, household, and community levels. We provide support for the previously untested hypothesis that PDS is negatively associated with infection, and document variation in PDS indicative of calibration to local socio-economic conditions.

### **Pandemic psychology is not simply pathogen-avoidance psychology**

*Ackerman, Joshua; Tybur, Joshua; Blackwell, Aaron<[joshack@umich.edu](mailto:joshack@umich.edu)>*

A substantial body of research has illuminated psychological adaptations motivating pathogen avoidance, mechanisms collectively known as the behavioral immune system. Can knowledge about these mechanisms inform how people respond to widespread disease outbreaks, such as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 / COVID-19) pandemic? We review evidence suggesting that the evolutionary history of the behavioral immune system, and the cues that activate it, are distinct in many ways from modern human experiences with pandemics. Moreover, the behaviors engaged by this system may have limited utility for combating pandemic diseases like COVID-19. A better understanding of the points of distinction and points of overlap between our evolved pathogen-avoidance psychology and responses to pandemics may help us realize a more precise and intervention-ready science.

### **Relational Mobility Predicts a Faster Spread of COVID-19: A 39-country Study**

*Salvador, Cristina; Berg, Martha; Yu, Qinggang; San Martin, Alvaro and Kitayama, Shinobu <[csalvad@umich.edu](mailto:csalvad@umich.edu)>*

It has become increasingly clear that COVID-19 transmits between individuals. It stands to reason that the spread of the virus depends on sociocultural ecologies that facilitate or inhibit social contact. In particular, the community-level tendency to engage with strangers and freely choose friends, called relational mobility (RM), entails increased opportunities to interact with a larger and more variable range of others. It may therefore be associated with a faster spread of infectious diseases, including COVID-19. Here, we tested this possibility by analyzing growth curves of confirmed cases and deaths of COVID-19 in the first 30 days of the outbreaks in 39 countries. We found the growth was significantly accelerated as a function of a country-wise measure of RM. This relationship was robust either with or without a set of control variables, including demographic variables, reporting bias, testing availability, and cultural dimensions of individualism, tightness, and government efficiency. Implications for the study of culture and pathogen threat are discussed.

### **The effect of fearful facial expressions in ultimatum bargaining**

*Reed, Lawrence; Enayetallah, Malak; Bachynski, Lauren<[lr113@nyu.edu](mailto:lr113@nyu.edu)>*

How do people respond to fearful facial expressions? In two experiments, we tested whether fearful expressions elicit prosocial or selfish behavior among perceivers. Participants viewed a video clip depicting a confederate partner displaying either a neutral or fearful facial expression before making a behavioral decision in one of two economic games. In the ultimatum game (Experiment 1), participant responders viewed either the neutral or fearful clip and specified a minimum acceptable offer (below which the pot would be destroyed). Here, participants specified significantly lower minimum acceptable offers in response to the fearful clip in comparison to the neutral clip. This suggests that fearful expressions elicit a contagious response among perceivers. In the dictator game (Experiment 2), participants viewed one of the same two clips and specified an amount to take from the confederate. Here, participants took significantly greater amounts in response to the fearful clip in comparison to the neutral clip. Taken together, these findings suggest that fearful facial expressions elicit fearful responses among perceivers. Furthermore, these fearful responses elicit selfish, rather than prosocial, behaviors in perceivers

### *Evolutionary Perspectives on Friendship Preferences, Formation, and Maintenance*

#### **Target-specific friend preferences: When we want kind, trustworthy, but also vicious friends**

*Krems, Jaimie Arona; Hahnel-Peeters, Rebecka K.; Merrie, Laureon A. <[jaimie.krems@okstate.edu](mailto:jaimie.krems@okstate.edu)>*

Conventional wisdom and robust findings suggest that people prefer friends who are kind and trustworthy, and that people reject friends who are mean, manipulative, and/or indifferent. We suggest that this work might be underspecified; that is, previous work tends to explore how people want their friends to behave without specifying a potentially

important and evolutionarily-relevant piece of information: Toward whom that behavior is directed. Humans selectively deliver different fitness benefits and costs to different classes of individuals (e.g., kin, allies, rivals). From an adaptationist perspective, friend preferences should be sensitive to the targets of friends' acts. For example, a friend should be differentially desirable depending on whether the friend is kind—or mean—toward me versus toward my rival. In a series of studies with U.S. participants, we explore the target-specificity of friend preferences, finding support for several predictions: (1) When targets are unspecified, people's friend preferences track preferences for how friends should behave toward them; (2) People want friends who are highly nice and trustworthy toward them (more than toward same-sex others or toward one's rivals) and reject friends who are mean, manipulative or indifferent toward them; (3) But people also want friends who are highly mean, indifferent, and manipulative—when that behavior is directed toward one's rivals. Findings challenge common wisdom suggesting that people eschew mean friends, and have broader implications for theories of cooperation associated with indirect reciprocity, reputation, and punishment (e.g., people cannot punish cheaters if they don't agree on who the cheaters are).

### **What traits make a desirable friend?**

*Eisenbruch, Adar B.; Roney, James R.<[adar.eisenbruch@msmc.edu](mailto:adar.eisenbruch@msmc.edu)>*

Friendships affect people's material, social, and emotional wellbeing across the lifespan, but evolutionary psychologists have only recently begun studying the traits that people seek in a friend. Here, we pursue the hypothesis that same-sex friendships evolved as ongoing cooperative relationships, so friend preferences should at least partially focus on those traits that would have made someone a good cooperative partner within the conditions of the human ancestral environment. This is in contrast to the dominant theory in social psychology that people pursue friends who help them fulfill their current goals. We have tested this hypothesis using several policy-capturing studies, but will focus here on a face perception paradigm in which participants rated the friend desirability of target faces that were also rated on several traits hypothesized to be relevant to ancestral partner value. We found that judgments of a target person's desirability as a friend depended on perceptions of their ability to create material benefits in the ancestral environment (e.g., skill as a hunter or gatherer). These effects were not due to an attractiveness "halo effect" or a preference for intelligence more generally. In addition, we found mixed evidence for sex differences that match the typical hunter-gatherer division of labor. We discuss implications of these findings for the study of friend choice, and for understanding social preferences more broadly.

### **More than shared attitudes: A challenge to traditional theorizing about social bonding**

*Merrie, Laureon A.; Krems, Jaimie Arona; Sznycer, Daniel<[laureon.merrie@okstate.edu](mailto:laureon.merrie@okstate.edu)>*

A prominent theory in social psychology—Balance Theory—holds that individuals like other people who share their (positive or negative) attitudes toward their social partners

(e.g., enemies, friends). However, Balance Theory cannot accommodate instances when shared love leads individuals not to greater liking, but instead to hatred. By contrast, an evolutionarily-informed view suggests that shared hate for my enemy might be mutually beneficial (shared hate should produce liking), whereas shared love for my romantic partner might foster competition (shared love should produce hatred). Across three studies among US adults ( $N = 1,575$ ), we propose and test a novel framework—one that can accommodate and explain these varied valuations of newcomers who share our hate or love toward our existing social partners (e.g., friends, romantic partner, enemies): Our appraisals of newcomers depend on the valance of our existing relationships, such that (a) increasing perceived zero-sumness in positive relationships leads us to increasingly dislike newcomers who feel similarly toward our partners; and (b) the more we perceive our enemies as fitness-suppressing, the more we like newcomers who share our hatred toward those enemies. That is, we do like newcomers who share our attitudes toward others, but not when this creates a rivalry for our partners' limited social niches. Findings challenge long-held beliefs about the role of shared attitudes in social bonding and suggest, more broadly, that attending to the real-world limits of sociality and to different classes of social partners can improve our understanding of sociality beyond the dyad.

### **Sex differences in competition: Distinguishing versus extinguishing friendships**

*Benenson, Joyce F. <[joyce.benenson@gmail.com](mailto:joyce.benenson@gmail.com)>*

Trivers' (1972) emphasis on mate competition versus parental investment provides a valuable theoretical framework for understanding numerous sex differences in human behavior. I review evidence that sex differences appear even within same-sex friendships from early childhood through adulthood where males compete and females nurture. Focusing on competition, across diverse cultures, males take pleasure in engaging in rough-and-tumble play, zero-sum games, sports, economic tournaments, status-based community institutions, and intergroup contests with same-sex friends, which allows them to highlight personal, pairwise, and group accomplishments. Because competition can threaten the viability of friendships however, it must be carefully regulated. Although cross-cultural evidence is lacking, documented regulatory processes in WEIRD males, but not females, include competing with those similar in status, within groups, by emphasizing playfulness, and through friendly physical contact. In marked contrast, females prohibit competition between friends. Studies with WEIRD females provide evidence that competition is avoided by downplaying personal strengths, self-disclosing weaknesses, stressing equality, disparaging third parties' superiority, disguising competition, and terminating friendships with a competitor. Re-analysis of a study of standardized competition between 42 male and 40 female pairs of young adult close same-sex friends showed that females disliked competing more than males did across conditions ( $p < .02$ ) and were less likely than males to offer to divide the monetary rewards with friends ( $p < .02$ ). Extending WEIRD findings on sex differences in competition and its accompanying regulatory processes to more diverse societies will help illuminate a critical aspect of human relationships and permit comparisons with other classes of relationships, including kin.

## *Personality & Individual Differences*

### **Sex differences in fearful personality traits: explained by facultative calibration to physical strength?**

*Chua, Kristine J.; Rodriguez, Nina; Durkee, Patrick; Lukaszewski, Aaron W.; Manson, Joseph H. <[kchua1110@ucla.edu](mailto:kchua1110@ucla.edu)>*

Many sex differences in psychological traits and disorders are culturally variable, but one appears particularly invariant: Women are higher in fearfulness, and the fear-linked personality dimensions of Big 5 Neuroticism and HEXACO Emotionality. Why? Based on adaptationist models predicting that fear- and anxiety-related traits should be functionally calibrated to variation in physical strength, recent work by Kerry and Murray (2018; 2021) has supported the hypothesis that women are higher in Big 5 Neuroticism because they are, on average, physically weaker—and therefore more vulnerable to social and ecological threats—than men. The current research extends this hypothesis to HEXACO Emotionality, especially its Fearfulness facet. Across four independent samples (Total N = 1,103 US undergraduates), we find that women score higher on HEXACO Emotionality and Fearfulness; men are physically stronger than women; and HEXACO Emotionality and Fearfulness are negatively correlated with physical strength. Within all four participant samples, physical strength mediated the association of sex with HEXACO Emotionality and Fearfulness, explaining 21-35% of the between-sex variance. Our findings support the hypothesis that fear-linked psychological sex differences are partly explained by the sex difference in physical strength, and suggest avenues for future clinical research regarding the sex-biased prevalence of fear- and anxiety-linked disorders.

### **Priming and personality predictors of social reasoning performance**

*Gary L. Brase <[gbrase@ksu.edu](mailto:gbrase@ksu.edu)>*

Different theories of human reasoning produce differential hypotheses about how personality and individual differences should relate to reasoning abilities. The present research documents a previously transient significant relationship between theory of mind ability (measured via the mind in the eyes test) and conditional reasoning performance, which is differentially stronger for social rules rather than for descriptive, non-social conditional rules (Study 1, n=316 undergraduates). A second study (n=289 undergraduates) additionally documented differential associations between reasoning and both interpersonal trust and Honesty-Humility, via both correlations and regression analyses. Secondarily, Study 2 also replicated a carryover effect for reasoning tasks, previously suggested as due to repetition priming. In a third study (n=334 undergraduates), participants took a battery of trait measures that included the above significant predictors of social reasoning, additional measures of theory of mind ability, intimate relationship (versus general interpersonal) trust, and emotional intelligence. Reasoning again differed across contents, showed priming/carryover effects between socialon-social reasoning tasks, and was significantly predicted by interpersonal trust and theory of mind. Consistently stronger correlations for social contents indicate a

facilitatory rather than inhibitory process, consistent with domain-specific reasoning mechanisms.

## **Niche Diversity and Personality Structure**

*Durkee, Patrick; Lukaszewski, Aaron; von Rueden, Chris; Gurven, Michael; Buss, David; Tucker-Drob, Elliot <[pdurkee@utexas.edu](mailto:pdurkee@utexas.edu)>*

The niche diversity hypothesis proposes that personality structure arises from the affordances of unique trait-combinations within a society. It predicts that personality traits will be both more variable and differentiated in populations with more distinct social and ecological niches. Prior tests of this hypothesis in 55 nations suffer from potential confounds associated with differences in the measurement properties of personality scales across groups. Using psychometric methods for the approximation of cross-national measurement invariance, we test the niche diversity hypothesis in a sample of 115 nations ( $N = 685,089$ ). We find that an index of niche diversity was robustly associated with lower inter-trait covariance and greater personality dimensionality across nations but was not consistently related to personality trait variances. These findings generally bolster the core of the niche diversity hypothesis, demonstrating the contingency of human personality structure on socioecological contexts.

## **An actuarially sound measure of mortality risk predicts human behavioral variation**

*Manson, Joseph H; Chua, Kristine J; Lukaszewski, Aaron W.<[jmanson@anthro.ucla.edu](mailto:jmanson@anthro.ucla.edu)>*

Theory and data from several biological and social science perspectives suggest that variation in individual mortality risk partly drives variation in future orientation, temporal discounting, and (more controversially) social and mating strategies. However, independent assessment of individual mortality risk remains a major challenge. As a novel methodological contribution to this debate, we hypothesized that the risk ratings assigned to purchasers of individual life insurance policies constitute a valid measure of mortality risk, and that they will therefore be associated with eight self-reported behavioral traits. We recruited an online sample of 402 U.S. residents (49.8% female, M age = 35.0 years). Bayesian regression analysis showed that after controlling for age, sex, and smoker status, individuals who were judged by the underwriting process to be at higher risk of death scored lower on consideration of future consequences and HEXACO conscientiousness, and higher on impulsivity, than individuals who were assigned lower risk ratings. Participants' self-estimated relative age at death was associated in the predicted directions with the above three traits as well as with parental effort, short-term mating orientation, aggressiveness, and two indicators of childhood environmental harshness. However, self-estimated relative age at death was not associated with underwriting-based risk rating. These results support our general hypothesis, and they generate additional hypotheses about the inputs to a postulated internal regulatory variable that tracks an individual's mortality risk.

## Session 8: Tuesday, June 29<sup>th</sup>, 7:10pm-8:40pm EDT

### *Romantic Attraction*

#### **Modelling the effects of gender inequity and income inequality on mating markets**

*Brooks, Rob; Blake, Khandis; Fromhage, Lutz<[rob.brooks@unsw.edu.au](mailto:rob.brooks@unsw.edu.au)>*

We model the effects of economic inequalities on within-sex competition for mates. Resources are often central to the formation and persistence of human consortships. As a result, the distribution of resources should influence the level of mating market opportunity or competition an individual of given status/wealth experiences. We predict that the status-dependent nature of within-sex competition may be responsible for the observations that economic inequality within a sex can amplify mating competition, and that inequalities between women and men also influence behaviours related to mating competition. We present a simple simulation model of a static hypergynous (women marry men of equal or greater wealth than themselves) preference and describe how it predicts mating competition among men and among women on a heterosexual mating market. Our model shows that the higher competition experienced by poorer men and richer women (when compared with richer men and poorer women) is amplified when gender gaps are small or when women out-earn men on average. Likewise, high economic inequality, especially among men, amplifies the competition experienced by these groups. We consider the political implications in terms of sex- and status-dependent attitudes to gender equity, income inequality, and hypergynous mating norms.

#### **Strategic interference: When deception protects me and helps you**

*Drs Lora Adair and Nicole Lozano <[lora.adair@brunel.ac.uk](mailto:lora.adair@brunel.ac.uk)>*

Men tend to express greater interest in short-term, casual sex and women tend to express greater interest in long-term, committed relationships. If men and women are likely to adopt different mating strategies, then heterosexual pairings may produce conflict. When this conflict occurs, research suggests that men adopt deceptive, coercive, or manipulative tactics to get what they want. These tactics are arguably maintained by norms and expectations that present men as sexual aggressors and women as targets of that aggression. We explore women's potential to use, rather than simply defend against, exploitative mating strategies. Women were recruited from a large Southern University in the United States ( $N = 123$ ; Mage = 19; majority White-on-Hispanic (77%), currently dating (49%)) to complete open-ended response items assessing experiences with perpetrating deceptive and exploitative tactics in mating contexts. Recurrent themes were identified and confirmed by three independent raters. Overall, we find that women in our sample feign romantic and sexual interest in others for pro-social, self-enhancement, and defensive reasons. Specifically, the most frequent themes identified in participants' descriptions of feigning romantic interest in someone were Entertainment, Emotional Gratification, and Conflict Prevention. This work extends our understanding of the use of exploitation in human mating, particularly illuminating

women's intentional deception of potential mates to avoid harm (anger or aggression in response to rejection) and incur benefits to others (helping other people feel wanted and desired). Our findings question the applicability of deception and intersexual conflict research from male-only samples, and theory from male-dominated perspectives, to women's experiences.

### **Mate Recognition and Relationship Disqualifiers**

*Walter, Kathryn; Kliszewski, Jared; Conroy-Beam, Daniel<[katyvwalter@gmail.com](mailto:katyvwalter@gmail.com)>*

Much of the human mating literature has focused on characterizing the qualities we find attractive, how we use that information to choose our mates, and how we maintain our relationships. Yet, a more fundamental problem that the mind needs to solve is where to direct these mating systems—who counts as a potential mate? One way this could work is for the mind to have a mental representation of the category “mate”: some set of viable mate criteria to which different individuals can be compared and identified as potential mates. But, what criteria do humans use to identify potential mates? Here, I will consider various traits, such as sex, religious affiliation, and political orientation, that might “disqualify” a person from being considered a potential long-term romantic partner. Using dyadic data from two samples of real-life couples,  $n = 522$  and  $n = 259$ , I examine the effect of incorporating these candidate disqualifier traits in mate choice simulations. Preliminary evidence suggests that sex narrows the potential mate pool, but most candidate disqualifier traits, colloquially referred to as “dealbreakers,” are actually categorical preferences influencing overall attraction.

### **Demonstrate Values: Moral Outrage as a Cue to Long-Term Mating Potential**

*Brown, Mitch; Keefer, Lucas A.; Sacco, Donald F.; Brown, Faith L.<[mb103@uark.edu](mailto:mb103@uark.edu)>*

Recent findings suggest moral outrage signals trustworthiness to others, and such perceptions critically facilitate identification of social opportunities unlikely to entail exploitation. From a sexual strategies theoretical perspective, inferences of these prosocial intentions could have downstream consequences from which individuals infer concomitant long-term mating interest and view individuals espousing outrage as optimal for monogamous pairbonds. Four experiments using heterosexual American undergraduates ( $N = 870$ ) investigated how moral outrage displays are perceived in mating contexts and how these perceptions facilitate desirability in long- and short-term contexts. Participants evaluated the long- and short-term mating affordances of prospective mates espousing outrage (or not) in hypothetical dating sites. Using appropriately dimensioned analyses of variance and t-tests, results indicated participants, particularly women, found prospective mates describing outrage-signaling activism to be more desirable for long-term mating (Study 1), with same-sex raters perceiving outrage as indicative of long-term mating interest (Study 2). While replicating women's attraction toward outrage, Study 3 additionally found outrage connotes trustworthiness in relationships from which women infer personality traits indicative of long-term reproductive success (e.g., conscientiousness). Study 4 finally identified a boundary condition on the desirability of outrage, wherein mere expression of outrage was insufficient to bolster women's attraction despite perceiving them as especially

prosocial. Such men were further perceived as connoting an antagonistic behavioral repertoire that could be costly in long-term mating contexts. Results suggest prosocial intentions signaled through outrage could implicate individuals as optimal long-term mates, though indicate outrage necessitates accompanying prosociality to communicate one's further capabilities to maintain long-term bonds.

### *Partner choice, social networks, and status in small-scale societies*

#### **Coalitions and conflict: A longitudinal analysis of men's politics**

*von Rueden, Christopher; Redhead, Daniel<[cvonrued@richmond.edu](mailto:cvonrued@richmond.edu)>*

To negotiate conflict and navigate status hierarchy, individuals in many species form coalitions. We describe inter-personal conflicts and assess theories of coalition-formation in a small-scale human society. Based on longitudinal and cross-sectional social network analysis of men in two communities of Tsimane forager-horticulturalists, we find evidence of reciprocity in coalitional support, as well as evidence of transitivity: an ally of my ally is likely to become my ally. We find mixed support for coalition formation between individuals who share a common adversary. Coalition formation was also predicted by food- and labour-sharing and especially by kinship. Physically formidable men and men higher in informal status were more likely to provide coalitional support over time; evidence was mixed that they receive more coalitional support. The highest status men are hubs of a dense coalitional support network that indirectly link all men in the community. These findings suggest male coalition formation is multiply motivated, and in general reveals the political dynamics that structure men's lives in small, relatively egalitarian communities.

#### **Strong Man, Generous Man, Warrior Man, Cheat: Determinants of status in an Amazonian community**

*Patton, John; Lukaszewski, Aaron; Zerbe, James<[johnpatton@fullerton.edu](mailto:johnpatton@fullerton.edu)>*

In, "Poor Man, Rich Man, Big Man, Chief", a classic paper on tribal political power and men's status, Marshal Sahlins (1963) lists important attributes that contribute to a man's position within the hierarchy of his social group, which include magical power, oratory skill, provisioning of food resources, and bravery in war and feud. This paper examines the roles of these and other attributes in determining hierarchical rank within Conambo, Ecuador—a small-scale Amazonian community of forager-horticulturalists. We produce a comprehensive model of men's status, which is predicted by social network position, and also by others' perceptions of a man's warriorship, intelligence, generosity, physical strength, humor, health, physical attractiveness, trustworthiness, and coalitional loyalty. Overall, data collected across nearly three decades resoundingly support reciprocity-based models of status allocation, which posit that status is conferred to others in exchange for the benefits they generate for people in the community.

#### **Personality and Social Status in an Amazonian Community**

*Lukaszewski, Aaron; Patton, John; Rahnejat, Jaime<[aalukas.1859@gmail.com](mailto:aalukas.1859@gmail.com)>*

Most data used to study human social evaluation and personality comes from industrialized modern societies, despite the fact that humans spent most of their evolutionary history in small-scale communities. This study tests evolutionarily informed hypotheses about the role of personality in predicting social status within a community of forager-horticulturalists in the Ecuadorian Amazon. We employed a round-robin methodology in which 42 adults (23 women) were ranked by familiar community members (N=33-42) on social status and personality traits [HEXACO Extraversion (X), Honesty-Humility (H-H), and Emotionality (E)]. Inter-ranker agreement was high in both sexes for social status and personality traits. Consistent with predictions, in both sexes, (1) X and H-H were strongly negatively correlated and (2) social status associated positively with X and negatively with H-H. In women, (3) status associated negatively with E. This study adds to a small body of findings that attest to the existence and fitness-relevance of folk personality concepts in small-scale communities, and replicate the finding of higher personality covariation in smaller- than larger-scale societies.

### **Hadza hunter-gatherers with greater exposure to other cultures preferentially share with generous campmates**

*Smith, Kristopher; Apicella, Coren <[krsmit@sas.upenn.edu](mailto:krsmit@sas.upenn.edu)>*

Researchers hypothesize that we have an evolved partner choice psychology that tracks the cooperative reputations of others and motivates us to compete for access to cooperative partners, such as by sharing more with them. However, recent models and evidence suggest cultural institutions shape this partner choice psychology. Here we test Hadza hunter-gatherers of Tanzania similarly share more with people perceived as cooperators and whether this is moderated by exposure to other cultures. Ninety-two Hadza ranked eight of their campmates on generosity and foraging ability and then played a game in which they could direct finite resources to those campmates. We found that Hadza with greater exposure to other cultures, such as via schooling or participating in the market economy, shared more preferentially with campmates they ranked higher on generosity, whereas Hadza with lower exposure showed no preference to sharing with generous campmates. However, this moderating effect was specific to generosity—regardless of exposure, Hadza did not share more preferentially with campmates ranked higher on foraging ability. These results suggest that cultural institutions shape Hadza partner choice psychology.

### *Evolution of Economic Preferences*

#### **Evolved attitudes to risk and the demand for equity**

*Arthur Robson, Allen Orr <[arthur\\_robson@sfu.ca](mailto:arthur_robson@sfu.ca)>*

The equity premium puzzle refers to the observation that people invest far less in the stock market than is implied by measures of their risk aversion in other contexts. Here we argue that light on this puzzle can be shed by the hypothesis that human risk attitudes were at least partly shaped by our evolutionary history. In particular, a simple evolutionary model shows that natural selection will, over the long haul, favor a greater

aversion to aggregate than to idiosyncratic risk. We apply this model—via both a static model of portfolio choice and a dynamic model that allows for intertemporal tradeoffs—to show that an aversion to aggregate risk that is derived from biology may help explain the equity premium puzzle. The type of investor favored in our model would indeed invest less in equities than other common observations of risk-taking behavior from outside the stock market would imply, while engaging in reasonable trade-offs over time

### **Super-additive cooperation**

*Charles Efferson, Helen Bernhard, Urs Fischbacher, Ernst Fehr*<[charles.efferson@unil.ch](mailto:charles.efferson@unil.ch)>

Identifying the evolutionary mechanisms responsible for one-shot cooperation among humans remains a highly contentious puzzle. Repeated interactions provide a canonical, if paradoxical, explanation (Haley and Fessler, 2005; Hagen and Hammerstein, 2006) for one-shot settings, with the key mechanism centred on ancestral uncertainty about whether a game is one-shot or repeated (Jagau and van Veelen, 2017). Group competition (e.g. Choi and Bowles, 2007) provides a different explanation with exactly the opposite status, heterodox but intuitively appealing. We show that neither mechanism in isolation reliably supports cooperation when actions vary continuously. Ambiguous reciprocity is a strategy, generally ruled out in models of reciprocal altruism, that completely undermines cooperation in repeated interactions and by extension one-shot settings. Group competition is a feeble mechanism because of cancellation effects at the group level (Akdeniz and van Veelen, 2020), and because groups tend to be similar under relevant conditions. Although repeated interactions and group competition do not support cooperation by themselves, combining them frequently triggers powerful synergies because group competition stabilises cooperative strategies against the corrosive effect of ambiguous reciprocity. With both mechanisms at work, evolved strategies often consist of cooperative reciprocity with ingroup partners and uncooperative reciprocity with outgroup partners. Results from a one-shot behavioural experiment we conducted in Papua New Guinea fit exactly this pattern. They thus indicate neither an evolutionary history of repeated interactions without group competition nor a history of group competition without repeated interactions. Instead, our results are only consistent with social motives that evolved under the combined influence of the two mechanisms acting together.

### **On the evolution of male competitiveness**

*Ingela Alger* <[ingela.alger@tse-fr.eu](mailto:ingela.alger@tse-fr.eu)>

Since a man's reproductive success depends on his ability to outcompete other men, male competitiveness may be expected to have been exposed to strong selective pressure throughout human history. Accordingly, the relatively low level of physical violence observed between men has been viewed as a puzzle. What could have limited the eagerness of men to out-compete each other? I study the evolution of male competitiveness in a model where men compete for both reproductive and productive resources. I show that high levels of male competitiveness are then consistent with evolution by natural selection if (a) the ecology is generous enough for men to supply

little or no food to their children, (b) competing is not too costly in terms of productive resources, and (c) relatedness among males is low enough.

### **`If you can, you must." The evolutionary foundation of reference point choice and loss aversion**

*Lionel Page, Gregory Kubitz <[lionel.page@uts.edu.au](mailto:lionel.page@uts.edu.au)>*

In the present paper we address the following questions: how and why do individuals set reference points and how do these reference points influence the individuals' satisfaction and behaviour? Our approach is to consider individuals as endowed with an innate subjective reward system shaped by evolution to motivate them to make the best decisions in terms of fitness. Rather than building a reward system precise enough to encode all the available information about options present in any given context, we show that a simpler and more flexible solution may be for evolution to allow the individuals to set themselves goals in terms of achievement. These goals act as reference points relative to which achievements are rewarded. This setting is able to explain key features about subjective utility. First, there is utility associated with setting oneself higher goals. Second, the utility function is S-shaped around goals. Third, in order for the individuals to meet the goal they set themselves, their utility function is steeper below their reference point, causing the individual to be loss averse.

## **Session 9: Tuesday, June 29<sup>th</sup> 8:40pm-10:00pm EDT**

### *The Psychology of Gossip: Cooperative and Competitive Functions*

#### **Gossip and Reputation in Everyday Life**

*Dores Cruz, Terence D.; Thielmann, Isabel; Columbus, Simon; Molho, Catherine; Wu, Junhui; Righetti, Francesca; de Vries, Reinout; Koutsoumpis, Antonis; Van Lange, Paul A. M.; Beersma, Bianca; Balliet, Daniel <[terence@terencedorescruz.com](mailto:terence@terencedorescruz.com)>*

Gossip—a sender communicating to a receiver about an absent third party—is hypothesized to impact reputation formation, partner selection, and cooperation. Lab experiments have found that people gossip about others' cooperativeness and that they use gossip to condition their cooperation. Here, we move beyond the lab and test several predictions from theories of indirect reciprocity and reputation-based partner selection about the content of everyday gossip and how people use it to update the reputation of others in their social network. In a Dutch community sample ( $N = 309$ ), we sampled daily events in which people either sent or received gossip about a target over 10 days ( $n_{\text{gossip}} = 5,284$ ). Gossip senders frequently shared information about targets' cooperativeness and did so in ways that minimize potential retaliation from targets. Receivers overwhelmingly believed gossip to be true and updated their evaluation of targets based on gossip. In turn, a positive shift in the evaluation of the target was associated with higher intentions to help them in future interactions, and with lower intentions to avoid them in the future. Thus, gossip is used in daily life to impact and update reputations in a way that enables partner selection and indirect reciprocity.

## **Competitive gossip: The impact of domain, resource value, resource scarcity, and coalitions**

*Hess, Nicole H.; Hagen, Edward H. <[nicolehess@wsu.edu](mailto:nicolehess@wsu.edu)>*

Those with better reputations often obtain more resources than those with poorer reputations. Consequently, gossip might be an evolved strategy to compete for valuable and scarce material and social resources. Influenced by models of nonhuman primate competition, we test the hypotheses that gossip (1) targets aspects of reputation relevant to the domain in which the competition is occurring, (2) increases when contested resources are more valuable, and (3) increases when resources are scarcer. We then test hypotheses derived from informational warfare theory, which proposes that coalitions strategically collect, analyze, and disseminate gossip. Specifically, we test whether (4) coalitions deter negative gossip and (5) whether they increase expectations of reputational harm to competitors. Using experimental methods in an Mturk sample (N=600), and survey and ego network analysis methods in a sample of California sorority women (N=74), we found that gossip content is specific to the context of the competition; that more valuable and scarcer resources cause gossip, particularly negative gossip, to intensify; and that allies deter negative gossip and increase expectations of reputational harm to an adversary. These results support social competition theories of gossip.

## **Gossip and boredom: Investigating the entertainment function of gossip**

*Yucel, Meltem; Westgate, Erin C. <[nmy2bg@virginia.edu](mailto:nmy2bg@virginia.edu)>*

Humans are social animals; we are inherently interested in hearing about others. This need to gossip serves a multitude of evolutionary and social functions. Here we investigate whether gossip serves to entertain us and reduce boredom. In Study 1, we administered the 24-item Gossip Functions Questionnaire (Foster, 2004) to a nationally representative sample (N = 2060). Participants also reported how bored they felt that day. Bored people gossiped significantly more ( $r = .20$ ). We also examined boredom's relation to the four social functions of gossip: entertainment, friendship, influence, and information. We found that entertainment, friendship, and influence functions were significantly associated with boredom ( $r > .17$ ). Interestingly, the information function of gossip was not associated with boredom. We then extended this work in another nationally representative sample (Study 2; target n = 2000), and experimentally manipulating gossip in an online experiment (Study 3; target n = 300). Together, these findings suggest that when people are bored, gossip may be used as an emotion regulation strategy rather than as a source of information.

## **What's up with gossip on WhatsApp: The evolutionary psychology of gossip in the digital age**

*Ingram, Gordon P. D. <[gp.ingram@uniandes.edu.co](mailto:gp.ingram@uniandes.edu.co)>*

In this paper I argue that the private messaging app, WhatsApp, is these days the most important medium for gossip, defined as covert talk about the social behavior of a third

party. Most studies of social interactions online have focused on public or semi-public posts to Facebook, Twitter or Instagram, which are easier for researchers to access than private messages. However, WhatsApp – which has largely replaced text messaging in many countries – is arguably more frequently used than any other social network. Here, I propose several testable hypotheses, derived from evolutionary theory, that could be applied to investigations of gossip on WhatsApp. H1) Most gossip on WhatsApp is predicted to be neutral or positive in valence, with few gender differences. H2) People are more likely to use WhatsApp's text feature than its voice note feature to spread negative gossip, since the latter would make them more identifiable if the message is forwarded. H3) People are also more likely to spread negative gossip in individual conversations than in group chats, since each person who sees the gossip is another person who could identify them. H4) All of these effects are likely moderated by age, with adult gossip being less negative – and more covert when it is negative – than adolescent gossip. I also propose a novel methodology to test these hypotheses, based on auto-evaluation of participants' own messages, which gets around the privacy problems, as well as pilot data using that methodology (N = 50 participants, 10 conversations per participant) that supports H1.

### *The Role of Body Shape in Human Social Life*

#### **Cross-cultural validation of the importance of cues of strength and reproductive value for male and female bodily attractiveness**

*Aaron Sell, Aaron Lukaszewski; Kristine Chua; Patrick Durkee; Daniel Szncyer <[asell@heidelberg.edu](mailto:asell@heidelberg.edu)>*

Adaptationist hypotheses have generated many empirically supported predictions about the visual determinants of human bodily attractiveness. Among the most theoretically robust predictions are: 1) that men's bodily attractiveness should be a function of their physical formidability – an indicator of status, protective ability, hunting, and genetic quality, and 2) that women's bodily attractiveness should be a function of their residual reproductive value (i.e. youth and low parity). We test these predictions with over 2,000 subjects from 14 diverse countries around the world. Subjects viewed a standardized set of male or female bodies and rated the targets' (i) fighting ability (i.e. formidability), (ii) parity (i.e. number of offspring), and (iii) overall bodily attractiveness. Across all tested nations, visual estimates of men's fighting ability was a powerful positive predictor of bodily attractiveness ( $r = \sim .80$ ). Similarly, across all tested nations, estimates of women's parity was a powerful negative predictor of bodily attractiveness ( $r = \sim -.90$ ). Furthermore, mediation analyses using anthropometric measurements (e.g., measured strength, waist size, BMI) give insight into which visual cues are responsible for these ratings. Men's measured strength associated with attractiveness via perceptions of fighting ability, whereas women's waist size associated with attractiveness via perceptions of parity.

#### **Accurate visual estimates of reproductive value explain the association of women's bodily features with physical attractiveness**

*Steven Gaulin, Aaron Lukaszewski; April Bleske-Rechek; Norm P Li; Dan Conroy-Beam <[gaulin@anth.ucsb.edu](mailto:gaulin@anth.ucsb.edu)>*

Heterosexual men judge women with low body mass indices (BMIs), waist-hip ratios (WHRs), and waist-stature ratios (WSRs) as physically attractive. Why? Considerable epidemiological and demographic evidence has undermined previous claims that such body shapes reliably indicate better health or higher fertility (probability of conception in a fixed interval). An alternative hypothesis, that these attractive body shapes instead indicate high residual reproductive value (*sensu* Fisher, 1930)—actuarially expected future reproduction—has received some support. We test this “nubility hypothesis” further in a rating study using body-minus-face photographs of 103 real women wearing standardized swim suits who vary in age from 14 to 70, previous offspring (parity) from 0 to 5, and whose BMI, WHR, WSR, and gluteofemoral mass (GFM) were measured. Participant samples from the USA and Singapore rated these photos for attractiveness, and also estimated each woman’s age or parity. We found that (1) as actual age and parity increased, women’s WHR, WSR, increased, while GFM decreased, (2) raters accurately estimated age and parity from available visual cues, and (3) associations of women’s actual age with attractiveness were statistically mediated by the impact of bodily features (e.g., WSR) on estimates of their age and parity. Overall, these findings support the nubility hypothesis: that the ‘hourglass’ figure—small waist size combined with greater gluteofemoral mass—registers as attractive due to its probabilistic association with youth and low parity, two of the key determinants of residual reproductive value for human females.

### **Fat location accounts for the poverty-obesity paradox in a nationally representative U.S. sample**

*Daniel Hruschka <[dhruschk@asu.edu](mailto:dhruschk@asu.edu)>*

For most of contemporary humanity, richer individuals have greater body mass. However, among women in the world’s wealthiest countries, this relationship often reverses, with poorer women having higher BMI. Explanations for this “poverty-obesity paradox” have variously relied on BMI as a measure of either total body fat (e.g., poverty leads to obesity) or attractiveness (e.g., discrimination against unattractive bodies leads to lower household income). If attractiveness is the important concept here, then we might expect fat location to also play a role in accounting for the paradox. This paper analyzes data from the nationally-representative U.S. NHANES III study ( $n = 2758$ ) to examine how a measure of body fat location (i.e., waist-to-hip ratio, WHR) might account for the puzzling BMI-income reversal. We confirm past findings that higher income is associated with lower BMI in women, but not men. As expected, WHR also shows this same pattern of relationships with income. But crucially, when controlling for WHR, the effect size of BMI is reduced by half and is no longer significant, indicating that the puzzling BMI-income reversal is really due to an association of body fat location with income. Whether and why fat location accounts for the puzzling income-BMI reversal more generally deserves further scrutiny in other samples and settings. More broadly, efforts to explain the “poverty-obesity paradox”

need to examine alternative measures of body size and shape to hone in on the most plausible explanations.

### **Weight location moderates weight-based self-devaluation and perceived social devaluation in women**

*Barlev, Michael; Ahra Ko; Jaimie Krems; Steven Neuberg*<[mlbarlev@gmail.com](mailto:mlbarlev@gmail.com)>

People with overweight and obesity devalue themselves, partially because they are socially devalued (e.g., stigmatized and discriminated against). However, for women, social valuation depends not only on how much weight they carry but on where on their bodies they carry it (i.e., their body shape). Here, we investigated whether weight-based self-valuation similarly depends on body shape. Study 1, using a nationally-representative sample from NHANES ( $N = 1,052$  reproductively-aged women) and proxy measures, found that self-devaluation and perceived social devaluation depended on weight location, above and beyond fat amount. Study 2 used an undergraduate sample of young adult women ( $N = 215$ ) and more focused measures. Study 2 found that with increased fat amount, women with an abdominal weight distribution reported more self-devaluation (e.g., lower self-esteem) and perceived social devaluation (e.g., higher perceived weight discrimination); women with a gluteofemoral weight distribution, however, were shielded—partially or fully—from these adverse effects.

## **Session 10: Thursday, July 1<sup>st</sup> 1:10pm-2:30pm EDT**

*Health, Mental Health, & Neurodiversity*

### **Explaining the autism spectrum: an evidence-based, evolution-framed approach**

*Hunt, Adam* <[realadamhunt79@gmail.com](mailto:realadamhunt79@gmail.com)>

Evolutionary scientists have the tools to provide illuminating ultimate explanations of mental disorder – some disorders may represent adaptations that are mismatched to modern environments, but the heterogeneity within mental disorder categories makes general explanations an intractable task. Here I present a novel method of systematic review to deal with this complexity. I exemplify it with autism spectrum disorder, distinguishing functional and dysfunctional subtypes, and supporting Baron-Cohen's account of autistic cognition as a hyper-systemising cognitive adaptation. Just as bio-archaeological evidence can be used to infer the evolutionary history of physical traits, genetics, epidemiology and anthropology can be used to infer the evolutionary function of psychological traits. Formulaically systemising this inferential process, I present the 'DCIDE method' of systematic review, an acronym for its sequence of Description; Categorisation; Inference; Depiction; Evaluation. Around 10-20% of cases of autism can be attributed to *de novo* mutations and environmental insults, often associated with intellectual disability. Other cases are eligible for adaptive explanations – evidence of phenotype, prevalence, onset and course, and male-skewed sex ratio then provide inferences of function, supporting Baron-Cohen's account of autism as hyper-systemising. The DCIDE method is specifically designed to repel the criticism that

evolutionary hypothesising is ‘just-so’ storytelling. In forcing hypothesising to be evidence-based and evolution-framed, the complexity of explaining mental disorders, some of which are true dysfunctions, others which are mismatched adaptations, can be parsed out. The DCIDE method could help evolutionary scientists to explain conditions which have confused psychiatry for decades, and could be widely applied in psychology and psychiatry.

## **Bad Feelings Are Usually Useless but Normal**

*Nesse, Randolph M. <[randy@nesse.us](mailto:randy@nesse.us)>*

Psychiatry has generally assumed that useless expressions of negative emotion indicate an abnormal regulation mechanism and that emotions arising from normal mechanisms should be useful. Both assumptions are false. Bad feelings are often and perhaps even usually useless products of normal mechanisms. Five main reasons account for their prevalence. The most important is the smoke detector principle: an optimal system is shaped to express many inexpensive false alarms to avoid a possible huge loss. Another is the adaptive lowering of response thresholds when repeated arousal indicates a defense system is providing insufficient protection. Such systems are especially prone to runaway positive feedback; chronic pain may be an example. Normal systems can also give rise to useless or absent responses when an unlucky sequence of experiences gives inaccurate information about the environment. Finally, natural selection shapes systems to express emotions that maximize gene transmission even when they are useless or harmful for individuals. Recognizing the prevalence of useless emotions arising from normal mechanisms could encourage depression and anxiety researchers to look not only for brain abnormalities, but also for normal emotion regulation mechanisms and the situations that can send them into positive feedback spirals. This perspective can also help patients and therapists to respect the general utility of emotional symptoms and the need to investigate their causes, while simultaneously taking all available measures to relieve useless symptoms. Several examples suggest productive research strategies.

## **Sex Ratio and Suicide across US Counties: A mediation analysis**

*Snopkowski, Kristin; Turner, Hallie<[kristinsnopkowski@boisestate.edu](mailto:kristinsnopkowski@boisestate.edu)>*

Evolutionary researchers have long puzzled over suicidal behavior. In this paper, we propose that when people are unable to achieve fitness-enhancing outcomes, including attracting a mate given unfavorable sex ratios, suicide rates increase. We test whether suicide rates are associated with county-level sex ratios utilizing data from the CDC’s Underlying Cause of Death database from 1999-2018, controlling for a variety of factors known to associate with suicide risk, including ethnic background, income, unemployment, veteran status, population density, and population growth or decline. We find that sex ratio is associated with suicide risk, where a greater proportion of males in a county (age 35-74) is associated with an increased risk of suicide for these males. Mediation analyses show that this effect is mediated by male marriage rates. Counter to predictions, male-biased sex ratios also tend to be associated with increased female suicide rates between ages 35 and 74, and this effect is mediated by unmarried

sex ratio. We discuss possible reasons for this counter-intuitive finding. Overall, these results suggest that male-biased sex ratios influence men's ability to marry and ultimately suicide risk, but limitations exist.

### **Binge Drinking is Associated with Sex-Specific Cognitive Deficits: Evidence for Condition-Dependent Trait Expression in Humans**

*Geary, David; Hone, Liana; Scofield, John; Bartholow, Bruce<[GEARYD@MISSOURI.EDU](mailto:GEARYD@MISSOURI.EDU)>*

This study tested the hypothesis that sex differences in visuospatial abilities (favoring men) and social-cognitive abilities (favoring women) will be attenuated with chronic stressor exposure, binge drinking in this case. Among light drinkers, men's typical advantage on visuospatial tasks ( $N_s = 73, 116$ ;  $ds = 0.72, 0.49$ ) and women's typical advantage on a social-cognitive task ( $N = 210$ ;  $d = 0.29$ ) was confirmed. Among binge drinkers, men's advantage was reduced for one visuospatial task and eliminated for another ( $N_s = 102, 93$ ;  $ds = 0.43, -0.26$ ), and women's advantage on the social-cognitive task was eliminated ( $N = 209$ ;  $d = 0.17$ ). Women who frequently engaged in extreme binges (> 11 drinks/episode) had exaggerated deficits on the social-cognitive task, as did their male counterparts on one of the visuospatial tasks. The results suggest sex-specific vulnerabilities associated with binge drinking, and support an evolutionary approach to the study of such vulnerabilities.

### *Couples, Parents, & Grandparents*

#### **More religious women have larger and more kin dense social networks in a country undergoing rapid market integration.**

*Lynch, Robert; Schaffnit, Susan; Sear, Rebecca; Sosis, Richard; John; Shaver, John; Blumenfield, Tami; Mattison, Siobhan and Shenk Mary <[robertflynn@gmail.com](mailto:robertflynn@gmail.com)>*

Globalization affects social relationships in fundamental ways. An increasing dependence on supply chains and integration into markets is frequently associated with the disruption of kin-based social networks. In the midst of these changes, religious beliefs and practices can offer stability, and as an important source of social capital are predicted to preserve or replace social connections disrupted by market integration. Here we use a detailed survey assessing the social networks and market integration of households in Bangladesh — a country experiencing rapid globalization — to test the hypothesis that religious beliefs provide a bulwark against some of the disruptive impacts that globalization can have on social relationships by strengthening bonds amongst kin. Results show that although the social networks of more religious women are more geographically dispersed, they are both larger and contain more kin. Furthermore, although the relatives in the networks of more religious women are no more likely to provide help with either childcare or financial assistance, they are more likely to provide emotional support, than the relatives in the networks of less religious women. Overall these results suggest that religion may play an important role in providing some types of social support as societies transition to market based

economies. We discuss the implications of these results for understanding the potentially destabilizing role that declining religious beliefs and practices can have on the emotional health and social cohesion of societies experiencing the impacts of globalization, and for understanding the role of religion in cultural evolution more generally.

### **Will granny save me? Birth status, survival, and the role of grandmothers**

*Nenko, Ilona; Chapman Simon N.; Lahdenperä Mirkka; Pettay Jenni E.; Lummaa Virpi <[ilona.nenko@uj.edu.pl](mailto:ilona.nenko@uj.edu.pl)>*

Grandmothers play very important role in families enhancing grandchild wellbeing and survival but their effects can be context-dependent. Children born in poor conditions are most likely to benefit from the investments made by helping grandmothers. In this study, we examined, whether grandmothers' presence modified associations between adverse birth status and survival up to 5 years of age. In detail, we verified, whether (i) firstborns, (ii) twins, (iii) children born within 24 months after their sibling, and (iv) children followed by short interval (i.e. their younger sibling was born within 24 months) survived better when either their maternal, paternal, or both grandmothers were present. Moreover, we evaluated whether illegitimate children survived better when the maternal grandmother was present. We used an extensive pre-industrial demographic dataset collected from parish population from years 1730-1895. We have shown that grandmother presence mostly does not mitigate poorer birth conditions. However, if the subsequent birth was after a short interval, grandchildren survived better when the maternal grandmother was present. Taken together, these findings highlight a limited, though very important, role of grandmothers in compensating the mother's investment in the new baby.

### **Parental dimorphism and attractiveness as indicators of offspring quality**

*Lidborg, Linda H.; Tanrikulu, Gülfem; Cooper, Gillian; Graham, Rachael P.; Pound, Nicholas; Meins, Elizabeth & Boothroyd, Lynda G. <[linda.h.lidborg@durham.ac.uk](mailto:linda.h.lidborg@durham.ac.uk)>*

So-called 'Good Genes' theories, such as the Immunocompetence handicap hypothesis, posit that sexually dimorphic (i.e. masculine) traits in males should be associated with greater fitness outcomes. Based on this, it can be expected that more masculine men should produce healthier, more viable offspring. This prediction has rarely been tested, however, and existing evidence for a linear relationship between paternal masculinity and offspring quality is equivocal (e.g. Boothroyd et al., 2017). An alternative or complementary route for more masculine men to improve fitness is by acquiring more fertile, better quality mates, often claimed to be indexed by increased femininity. Here, we test the associations between both paternal and maternal traits and offspring quality, indexed by health and survival, in two studies. In study 1, we test whether parental facial traits (facial dimorphism, attractiveness, perceived health, and physical dominance), height, and strength predict longitudinal offspring health in a British sample (N=96). In study 2, we report the relationships between parental facial traits (dimorphism, attractiveness, and perceived health) and offspring health and survival in a sample of 26 Turkish families. While results are mixed, we find little

evidence suggesting that parental traits predict offspring quality. Results are discussed in terms of their implications for sexual selection research.

### **Families that stay together, stress together: Exploring couple satisfaction and cortisol synchrony within families**

*Short, Tori; Garza, Ray; Wood, Erin; Byrd-Craven, Jennifer<[tori.short@okstate.edu](mailto:tori.short@okstate.edu)>*

Early life experiences play an instrumental role in shaping developmental trajectory, partly through calibrating the stress response for a given environment. Previous research has highlighted the importance of parental investment across offspring development, with an overall emphasis on the role of mothers. However, less work has been done to examine specifically how children's biobehavioral outcomes relate to relationship quality between parents rather than only observing the dyadic relationships between mother-child and father-child. The purpose of this research was to gain more understanding of father's role in hormonal attunement when considering complex dynamics of the family as a unit. Families completed monthly questionnaires across six months and an in-home visit when the infant was four months of age, during which parents and infants completed semi-structured interaction tasks and provided saliva samples for cortisol, testosterone, and progesterone. Results show that father and mother's relationship satisfaction (reported by the mother upon study enrollment as well as during the four-month visit) was significantly related to their infant's cortisol levels, where higher couple satisfaction indicated lower infant cortisol levels. Additionally, when fathers and mothers' cortisol fluctuations were coordinated with one another, parents' cortisol patterns were also attuned to those of their infants. These findings suggest that relationship quality and hormonal attunement between mother and father help to understand infant's baseline cortisol levels as well as co-regulation of the stress response system.

### *Development & Life History Theory*

#### **The Hidden Talents Approach: Theoretical and Methodological Challenges**

*Frankenhuis, Willem; Young, Ethan; Ellis, Bruce<[w.e.frankenhuis@uu.nl](mailto:w.e.frankenhuis@uu.nl)>*

It is well established that people living in adverse conditions tend to score lower on a variety of social and cognitive tests. However, recent research shows that people may also develop 'hidden talents', that is, mental abilities that are enhanced through adversity. The hidden talents program sets out to document these abilities, their development, and their manifestations in different contexts. Although this approach has led to new insights and findings, it also comes with theoretical and methodological challenges. This talk focuses on the challenge of making predictions when adaptive and impairment processes operate in concert during development. We review the types of empirical research designs used to date to address this challenge. Some studies have compared different abilities within the same person, expecting one ability to be impaired by adversity (e.g., inhibition) and the other to be enhanced by it (e.g., working memory updating). Other studies have compared a single ability across different conditions,

expecting impaired performance in some conditions (e.g., with abstract content) and enhanced performance in other conditions (e.g., with ecologically relevant content). We discuss the pros and cons of each design and provide recommendations for future research designs. We conclude that the hidden talents approach is promising, but there is much scope for refining ideas, clarifying predictions (including statistical criteria used to quantify support), and establishing empirical designs that allow researchers to tease apart the contributions of adaptive and impairment processes to cognitive abilities that are enhanced in adverse conditions.

## **Development of False Belief Understanding in ni-Vanuatu Children**

*Brandl, Eva; Emmott, Emily H; Mace, Ruth <[ucsaekb@ucl.ac.uk](mailto:ucsaekb@ucl.ac.uk)>*

Theory of Mind - the ability to simulate what others think, want, and feel - is a key component of human social cognition. Much research has been devoted to False Beliefs – the ability to understand that others can hold beliefs that conflict with reality. Initially, the development of False Belief understanding was thought to be mostly fixed across populations, emerging at 4-5 years of age, at least in verbal tasks. However, some theorists have proposed that Theory of Mind is culturally evolved, and recent work shows that the developmental timing of False Belief understanding may vary across cultures. Notably, extreme findings have been obtained in rural Vanuatu, a Pacific island nation where nearly half of 13- to 14-year-olds failed to pass a classic change-of-location task. But are these findings reliable? Here we present results from a replication study with ni-Vanuatu children from a rural area (N = 175, aged 3.5 to 11.8 years), with additional controls in which participants had to justify their responses. While most 5-year-olds failed a classic change-of-location task, most 9- to 11-year-olds passed (75%). Most 9- to 11-year-olds also passed Appearance-Reality (>90%), and Belief-Emotion (>90%). Justifications suggest that False Belief tasks with lower pass rates (such as Contents False Belief) do not capture the participants' true abilities in this setting. While our results suggest that Theory of Mind is in part culturally learnt, they also show that some tasks may exaggerate culture effects, highlighting the importance of replications and additional controls in cross-cultural work.

## **Infants' social evaluations depend on the beliefs guiding acts of help**

*Woo, Brandon; Spelke, Elizabeth <[bmwoo@g.harvard.edu](mailto:bmwoo@g.harvard.edu)>*

Mature moral judgments privilege the mental states (e.g., intentions, beliefs) that underlie others' actions over the outcomes of their actions, but the origins of our capacities for mental state inferences and intention-based moral reasoning are obscure. Research on young children has long revealed tendencies to base moral judgments on outcomes rather than intentions, but it is unclear whether children are unable to reason about the beliefs that modulate others' intentions, or are confused by the verbal scenarios presented to them. To distinguish these possibilities, we probed the origins of intention-based social evaluation nonverbally. Fifteen- and 8-month-old infants (total N = 96) were presented with videos of two social agents who had true or false beliefs concerning the outcomes that their actions would produce for a protagonist in need of help. Following all displays, we presented infants with the two agents, and assessed

infants' evaluations through their preferential looking to agents. In both age groups, we found that infants preferentially looked to agents who intended to help the protagonist, even when agents' actions were guided by false beliefs and therefore did not help the protagonist. Thus, intention-based social evaluation of agents with false beliefs occurs in infancy, well before children begin to connect beliefs to moral behavior in explicit, verbal tasks. These experiments provide evidence that moral reasoning is mentalistic, rather than outcome-based, at its foundation. The present findings raise questions about the adaptive function of mental state reasoning, and the nature of infants' and nonhuman primates' mental state representations.

### **Taming the confusion in the human life history literature**

Sear, Rebecca <[rebecca.sear@lshtm.ac.uk](mailto:rebecca.sear@lshtm.ac.uk)>

Interest in incorporating life history theory from evolutionary biology into the human sciences has grown rapidly in recent years. Two core features of this research have the potential to prove valuable in strengthening theoretical frameworks in the health and social sciences: the idea that there is a fundamental trade-off between reproduction and health; and that environmental influences are important in determining life history outcomes. There is a barrier to furthering this interdisciplinary agenda, however: the term 'life history theory' is applied to quite different research programmes in the evolutionary human sciences, creating considerable confusion in the literature. Making progress in this field therefore requires that the conceptual differences between these research programmes are recognized. Here, I review the different approaches to studying life history, and related behavioural, outcomes from evolutionary biologists, anthropologists and psychologists, and describe the conceptual and historical differences between them. I then make recommendations for improving the usefulness of this literature, which include: greater precision when using the language of life history theory, greater emphasis on life history trade-offs rather than life history strategies, and more empirical work examining life history outcomes cross-culturally, and investigating how life history and behavioral outcomes may be related. Taming the confusion in the human life history literature is important because a rigorous, theoretically and empirically sound research programme on human life history has the potential to better our understanding of human health and behaviour.

### *Naïve sociology: How infants and children represent social relations and structures*

### **Early representations of social intimacy: Infants, toddlers, and children use saliva sharing as a cue of social closeness**

Thomas, Ashley; Woo, Brandon; Nettle, Daniel; Spelke, Elizabeth; Saxe, Rebecca <[athomas@g.harvard.edu](mailto:athomas@g.harvard.edu)>

In all human societies, people form 'thick' relationships, which are characterized by strong and enduring attachments and specific moral obligations. While thick relationships often occur between genetic relatives, not all thick relationships are

between genetic relatives and not all genetic relatives form thick relationships. How do young children identify thick relationships in their social environments? One possible cue is the sharing of bodily fluids, which occurs within thick relationships across many cultural settings. Here we provide evidence that children ( $n = 113$ ), toddlers ( $n = 84$ ), and infants ( $n = 81$ ) infer that individuals who act in ways which suggest saliva-sharing have a different kind of relationship with one another than do other social partners. Children expect saliva sharing to happen within nuclear families, and infants and toddlers expect these behaviors to occur between individuals who respond to one another in states of distress. Survey data from parents ( $N=129$ ) confirm that saliva sharing interactions are a valid cue of relationship thickness in these populations. The ability to use specific cues to infer categories of social relationships therefore emerges early in life and may be independent of explicit teaching. We suggest that this ability supports early learning about culturally variable relationships between people who are closest to one another, both within and beyond families.

### **Infants assume social relations to be based on univocal coordination rules**

*Tatone, Denis; Pomiechowska, Barbara; Csibra, Gergely*<[denis.tatone@gmail.com](mailto:denis.tatone@gmail.com)>

According to Relational Models Theory (Fiske, 1992), humans organize the gamut of social interactions into four discrete relational models, each based on a distinct coordination rule. A central implication of this theory is that social relations can only be governed by one model at a time. Across four looking-time experiments, we investigated whether such an assumption guides how infants individuate agents. Building on previous work showing that infants interpret giving and tolerated taking as diagnostic cues of different relational models, we tested whether 12-month-olds ( $n = 64$ ) would resolve spatiotemporally ambiguous events in relationally consistent ways. Infants were presented with an agent appearing twice from behind a screen and sequentially performing two transferring actions. When the agent interacted with a single patient in a relationally inconsistent way (by giving and taking), infants inferred the presence of two agents behind the screen. This was the case regardless of whether the agent remained featurally identical (Experiment 1) or changed features between transfers (Experiment 4). No such inference was instead drawn when the event did not contradict assumptions of relational consistency, such as when the agent gave to one patient and took from another (Experiment 2) or when two featurally distinct agents interacted with the same patient via the same action (Experiment 3). Taken together, these results corroborate the hypothesis that infants interpret giving and taking as cues of different relational models and assume these to univocally map onto distinct social relations.

### **The structural shape of social dominance hierarchies**

*Mascaro, Olivier; Goupil, Nicolas; Pantecouteau, Hugo; Van der Henst, Jean-Baptiste* <[olivier.mascaro@gmail.com](mailto:olivier.mascaro@gmail.com)>

Social dominance hierarchies take only a restricted set of structural shapes across societies and cultures. We investigate the origins of these regularities, (i) by determining the structural shape of children's hierarchies, and (ii) by assessing infants' expectations

about the shape of hierarchies. We focus on triadic motives — observed for sets of three individuals. In Study 1, we analyze a set of children's social dominance networks ( $n = 208$ , 15 independent groups). We observe that pyramidal triadic motives —one agent dominating two other ones — are much more frequent than tree-like triadic motives —two agents dominating another one ( $p < .001$ ). Simulations indicate that this pattern can be explained by an overabundance of pyramidal motives in children's actual dominance hierarchies. In Studies 2 and 3 ( $n = 96$ ), we investigate infants' expectations about triadic dominance motives. We familiarize 14-month-olds with 2D animations showing that some agents dominate other ones, i.e., consistently prevail in a competitive situation. During the test, infants look significantly longer at interactions that violate, rather than confirm, pyramidal motives ( $p = .028$ ). In contrast, infants do not look longer at patterns that violate, rather than confirm, tree-like motives. Controls confirm that these results cannot be explained by low-level features of videos, or by parental influence. Thus, children's actual dominance networks tend to be pyramidal (rather than tree-like). Furthermore, pre-verbal infants expect social dominance networks to be organized according to pyramidal triadic motives. These results contribute to explain why humans' social dominance structures tend to converge towards pyramidal shapes.

### **Children prioritize relational over dispositional interpretation of third-party interactions**

*Pomiechowska, Barbara; Tatone, Denis; Mészégető, Dorottya; Revencu, Barbu; Csibra, Gergely*<[barbara.pomiechowska@gmail.com](mailto:barbara.pomiechowska@gmail.com)>

Observing a social interaction allows one to infer the dispositional traits of the agents involved and/or their social relation. It is debated which of these strategies is primary in ontogeny. We addressed this question by investigating how preschoolers and adults interpret dyadic interactions involving nonviolent conflict between two animated agents. In the induction phase of each trial, 4-year-olds ( $n = 60$ ) watched one of two agents succeeding to collect the ball they both sought. At test, an occluder prevented participants from seeing the outcome of the conflict, and they were asked to indicate which agent took the ball. We varied across trials whether the same pair of agents, a new dominant (replacing the agent who previously prevailed), or a new subordinate (replacing the agent who previously yielded) were involved in the test conflict. Children reliably chose the agent who previously prevailed in the same-agents condition and responded randomly in the new-partners conditions. This indicates that their choices were informed by relational inferences: they posited a stable dominance relation within the dyad observed in the induction and did not expect the agents to prevail or yield again in a conflict with a new partner. Conversely, in similar tasks, adults ( $n = 103$ ) chose more often the previously dominant agent both in the same-agents and new-subordinate conditions, suggesting that, besides inferring stable status asymmetries within the dyad, they generalized the disposition to prevail on others. Overall, our results suggest that relational inferences are developmentally prior to dispositional inferences.

Session 11: Thursday, July 1<sup>st</sup> 2:30pm-4:00pm EDT

## *Contexts of development in humans and non-human primates*

### **Influences of Developmental Niche on the Emergence of Percussive Tool Use in Capuchin Monkeys (*Sapajus libidinosus*)**

*Briseida Resende, Andres Ballesteros-Ardila, Dorothy Fragaszy, Elisabetta Visalberghi, Patrícia Izar <[briseida@usp.br](mailto:briseida@usp.br)>*

Human and non-human primates adapt to a diversity of contexts through social learning. Experience with object manipulation provides the basis for learning technical skills and traditions. The study of a nonhuman primate can help us in the understanding of shared processes with humans. We studied how objects influence the development of tool using skills in a wild population of brown capuchin monkeys (*Sapajus libidinosus*) from the state of Piauí, Brazil, where tools are used on a regular basis. Our goal was to investigate the reuse of artifacts and scrounging of nuts left by the individuals on nut-cracking sites. We filmed 33 capuchin monkeys spontaneously using stones to crack open nuts in four discrete field seasons. We registered the frequency of stone and nuts manipulation, if they were used before for another monkey, and the outcome of the cracking attempts. We analyzed the proportion of monkeys' visits to cracking sites per season in which they scrounged edible leftovers or reused artifacts of conspecifics' cracking activities. Independent variables were level of cracking skills, age, behavioral variability, and the presence of the previous cracker (present during immediate reuse; absent during delayed reuse). Our analyses used the monkeys' ages (in months), an index of behavioral variability and an index of proficiency as developmental categories indicating cracking skills (regressors) in Generalized Linear Mixed Model. We found that younger monkeys were increasingly likely to reuse the stone used by another as they increasingly focused on the relevant actions to cracking.

### **Effect of age and gender on the presence of object affordances at home**

*Renata Defelipe, Briseida Resende <[redefelipe@gmail.com](mailto:redefelipe@gmail.com)>*

The motor opportunities that caregivers and the surrounding offers to children are fundamental to adequate infant motor development. In post-industrialized societies, during the first two years, life mostly occurs at home. A supportive home provides affordances or educational/learning materials (e.g. toys, books), space, and stimulation from family members. With the pandemic, the home environment gained greater protagonism to infant's motor developments because it is the place where people sleep, eat, work, practice sports, socialize, and interact with their relatives and children. Our goal was to investigate the effect of age and gender on the presence of object affordances at home during the pandemic in 80 children with three different ages (6-10 months, 11-15 months, and 16-18 months). Older infants had more objects at home with boys possessing more toys like cars, trains or animals, and girls, more toys like dolls and other characters with accessories (bottle, clothes).

### **Social Network Analysis applied to child social behavior research: how the past can support the future?**

*Adriana Sicuto, Patrícia Monticelli <[adrianasicuto@gmail.com](mailto:adrianasicuto@gmail.com)>*

Social Network Analysis is an important social development study tool due to its ability to access refined characteristics of social structures, among other advantages. In the coming years, researchers in developmental psychology and related areas will find a population of children and adults impacted by the social withdrawal imposed by the pandemic scenario for different periods of time and intensities, resulting in a new demand for studies on such implications and management strategies, for example. In this presentation I want to talk about the past, present and future possibilities of using the Social Network Analysis applied to children's social development, especially regarding early childhood. The objectives are to highlight the main applications and discoveries made to date on the ontogeny of human social behavior and promote discussion on how this prior knowledge and potential gaps can be explored to support new issues and methodologies that may be necessary after the potential effects of covid-19 in child social development.

### **Digital Media from a ethological point a view**

*Raphael Cardoso <[cardosorph@gmail.com](mailto:cardosorph@gmail.com)>*

Technology is a hallmark of human culture. Tool use has been a traditional scientific theme in ethological studies. The advances in this area are recognized by other research fields such as robotic, cognitive sciences and neurosciences. However, ethological research on digital media is still scarce, even though screen time with digital media represents almost 1/3 of the children of their daily routine. Here, I present some efforts to establish a research agenda to promote an ethological approach on the use of digital media in Brazil. Some results from initial investigations are presented: 1) interaction children-interface and solving problems; 2) risks of the digital screen time on the healthy development; 3) the possible collaboration of evolutionary psychology to Uncanny Valley research. The difficulties to pursue this agenda in Brazil also are presented here: 1) lack of teaching of computational skills or technological knowledge during the Psychology and Biology undergraduate course; 2) the interdisciplinary nature of this scientific theme; 3) the current lack of incentives for scientific research in Brazil. The study of digital media may benefit from an ethological framework and represent new opportunities and challenges to this scientific field.

### *Novel Insights into the Hormonal Processes Underlying Female Sociality*

#### **Uncovering the hormonal underpinnings of female friendships**

*Byrd-Craven, Jennifer; Rankin, Ashley M.<[jennifer.byrd.craven@okstate.edu](mailto:jennifer.byrd.craven@okstate.edu)>*

The unique features of female friendships are reflected in hormonal (cortisol and progesterone) correlates. The HPA and HPG axes work closely to coordinate mitigation of threat and affiliative behavior. Women monitor their friendships more closely than men and show a more pronounced stress response to social rejection. We sought to probe the impact of social-evaluative threat (TSST) on synchrony in the HPA and HPG axes when only one friend experiences threat in order to determine the mechanisms

behind the stress buffering impact of friendships. In other words, to what extent are the HPA and HPG axes coordinated between friends during differential experiences and to what extent can friends buffer the experience of social-evaluative threat? One friend participated in the TSST (with acceptance, rejection, and neutral conditions), and then friends were reunited, but unable to exchange verbal information about the events during their separation. We found that friends showed cortisol attunement across time, regardless of condition, while progesterone was more responsive to condition. These findings suggest that the interplay between HPA and HPG axes is influenced by both social demands and available social support.

### **Hormonal predictors of maternal-infant social attunement in breastfeeding dyads**

*Hahn-Holbrook, Jennifer; Marino, Jessica<[jmarino2@ucmerced.edu](mailto:jmarino2@ucmerced.edu)>*

From an ultimate evolutionary perspective, natural selection likely favored mothers who were able to shift their attention away from other fitness pursuits to instead prioritize their infant's needs. Hormonal changes associated with lactation, namely higher prolactin, lower estradiol & progesterone, and lower stress-induced cortisol, are potential time-matched, proximate mechanisms that may facilitate greater maternal-infant attunement postpartum. To test this hypothesis, 52 breastfeeding mothers were invited into the laboratory to feed their baby, either directly from the breast or with breast milk in a bottle, before participating in a 12-minute video-recoded free-play session with their infant. Salivary estradiol, progesterone, and cortisol levels were taken at baseline before the feeding session. Salivary cortisol and plasma prolactin were measured after the feeding session. Play session videos were coded for mothers' sensitivity, affect, and intrusiveness. As predicted, mothers who breastfed in the laboratory or who had higher plasma prolactin were rated as more sensitive in the play sessions than mothers who bottle-fed or mothers with lower prolactin. Contrary to our predictions, mothers who breastfed in the lab did not have higher prolactin, and mothers with higher estradiol and cortisol levels were more attuned to their infants needs than mothers with lower estradiol and cortisol levels. When all hormonal measures were entered into a multivariate regression model together, only higher cortisol emerged as a predictor of greater maternal attunement. Higher cortisol may help mothers attune to their infant's needs, especially in a social evaluative threat context when maternal behavior is video-recorded in a laboratory setting.

### **Examining the extent to which testosterone and sociocultural factors explain women's (versus men's) lower dyadic sexual desire**

*French, Juliana E.; McNulty, James K.; Makhanova, Anastasia; Eckel, Lisa A.; Nikonova, Larissa; Meltzer, Andrea L.<[french@psy.fsu.edu](mailto:french@psy.fsu.edu)>*

Marital quality is notoriously difficult to maintain over time, and evolutionary perspectives suggest that sex plays a key role in the maintenance of long-term pair bonds such as marriage. Nevertheless, women typically experience relatively lower levels of sexual desire compared to men; such differences in women's versus men's sexual desire may undermine sexual processes that facilitate sustained long-term relationship quality. Utilizing a sample of 100 newlywed spouses and a longitudinal

design, we tested competing predictions regarding hormonal versus psychosocial sources of sex-differentiated sexual desire. Specifically, we examined the extent to which baseline levels of testosterone versus sociocultural and other associated variables (e.g., feminine and masculine sex-role identification, stress, mood, self-esteem) accounted for differences in women's versus men's sexual desire for their spouse (i.e., dyadic sexual desire) across a two-week daily diary period. Results demonstrated that women reported lower levels of dyadic sexual desire than did men across the two-week period, and differences in women's versus men's testosterone levels at baseline completely accounted for women's relatively lower levels of desire. In contrast, none of the sociocultural or psychosocial variables accounted for women's lower levels of dyadic sexual desire. We also examined the dyadic implications of low partner sexual desire for subsequent marital satisfaction and found that low partner sexual desire erodes marital satisfaction through perceptions of low partner commitment. Together, these results suggest that differences in women's versus men's sexual desire can erode relationship quality, and a key underlying source of this sex difference is women's relatively lower testosterone levels.

### **Future directions in women's sex hormone research: Anovulation, progesterone, and hormonal interventions**

*Hill, Sarah E. <[s.e.hill@tcu.edu](mailto:s.e.hill@tcu.edu)>*

The past several years have been marked by an explosion of interest in the psychological and behavioral effects of women's cyclically-changing sex hormones. Much of this research has focused on the relationship between the hormonal changes that accompany ovulation and changes in women's partner preferences and sexual behavior. Although this research has offered valuable new insights into the psychological changes that occur in response to increasing levels of estradiol, there are a number of research questions about the impact of women's hormones outside of ovulation that promise to offer important new insights into women's psychological experiences in the realm of mating and beyond. In this presentation, I highlight three promising areas of research on women's hormones about which little is currently known. In particular, I will talk about the psychological factors that impact failure to ovulate, the causes and consequences of differing levels of progesterone, and how we can use research on the impact of hormonal interventions to better understand the mechanics of women's evolved psychology. The talk will close by outlining new hypotheses for researchers to consider as they seek to better understand the complex relationship between women's sex hormones, psychological changes, and behavior.

### *Theories of Knowledge*

#### **On the Automatic Nature of Threat: Physiological and Evaluative Reactions to Survival-Threats Outside Conscious Perception**

*March, David <[march@psy.fsu.edu](mailto:march@psy.fsu.edu)>*

Humans ostensibly inherited neural architecture that preferentially processes immediate survival threats (i.e., threat superiority). The empirical literature on threat superiority, however, has suffered two problems: distinguishing threatening from negative stimuli and differentiating whether responses are sped/strengthened by threat sensitivity or delayed/diminished by conscious attention to nonthreatening stimuli. The current work addresses both problems to test whether the mind is uniquely sensitive to survival threats. Two pilot studies ensured that stimuli remained outside conscious perception. Three within-subject studies that compared responses to empirically validated sets of threatening, negative, positive, and neutral stimuli, and isolated threat sensitivity from the opposing effect of conscious perception. In each study, two a priori orthogonal contrasts were consistent with threat superiority. In Study 1, threat stimuli yielded a stronger skin-conductance response than the mean skin-conductance response to negative, positive, and neutral stimuli, and there was no systematic variability among the latter three. In Study 2, threat stimuli elicited a larger startle-eyeblink than the mean startle-eyeblink to negative, neutral, and positive stimuli, and there was no systematic variability among the latter three. In Study 3, participants rated threat stimuli less positively than the mean valence of the negative, neutral, and positive stimuli, and there was no systematic variability among the latter three. By comparing responses to threatening, negative, positive, and neutral stimuli, and isolating threat sensitivity from the opposing effect of conscious attention, the current work demonstrates the minds unique sensitivity to survival threats. Preferentially processing and responding to immediate danger is functional for survival.

### **How the mind defines intentionality**

*Tadeg Quillien, Tamsin German <[tadeg.quillien@gmail.com](mailto:tadeg.quillien@gmail.com)>*

Cognitive scientists have been debating how the folk concept of intentional action works. We suggest a simple account: people consider that an agent did X intentionally to the extent that X was causally dependent on how much the agent wanted X to happen (or not to happen). Combined with recent models of human causal cognition, this definition provides a good account of the way people use the concept of intentional action, and offers natural explanations for puzzling phenomena such as the side-effect effect. We provide empirical support for our theory, in studies where we show that people's causation and intentionality judgments track each other closely, in everyday situations as well as in scenarios with unusual causal structures. Study 5 additionally shows that the effect of norm violations on intentionality judgments depends on the causal structure of the situation, in a way uniquely predicted by our theory. Taken together, these results suggest that the folk concept of intentional action has been difficult to define because it is made of cognitive building blocks, such as our intuitive concept of causation, whose logic cognitive scientists are just starting to understand.

### **Can a bean plant get sick like a cow? Evolution of folk biological knowledge with a shifting subsistence system**

*Heckelsmiller, Cynthiann; Lightner, Aaron D.<[c.heckelsmiller@wsu.edu](mailto:c.heckelsmiller@wsu.edu)>*

Folk biological knowledge, or cultural knowledge about plants and animals, that is relevant to subsistence evolves as societies adapt to their local environment. Environmental conditions change, however, pressuring societies to update their subsistence practices and their underlying knowledge about local biological kinds. Our study therefore asks how humans repurpose their culturally evolved conceptual models about biological kinds after adopting novel subsistence strategies. We studied Tanzanian Maasai pastoralists who, after centuries of primarily herding, have recently adopted agricultural practices from neighboring groups and Westernized scientific organizations. Following extensive key-participant and focus-group interviews on folk biological concepts, we interviewed 181 adults with varying levels of agricultural experience. Using vignettes, we asked participants to explain disease causes, treatments, and prevention strategies for one traditional and one novel domesticate (a cow and a bean plant respectively), and coded responses based on the presence of traditional vs. Western scientific concepts. We hypothesized that pastoralists with less agricultural experience would generalize their plant concepts from traditional Maasai concepts, whereas those with more agricultural experience would have plant concepts more aligned with a Western scientific model. We found that while participants had more detailed explanatory models for cows compared to plants, both cases included traditional and novel Western scientific concepts. More farming experience was negatively correlated with more traditional models. Participants frequently combined traditional and novel scientific concepts (e.g. antibiotic injections ascribed warming properties), and used commercial treatments in ways that align with Maasai cultural models.

### **When knowledge is hidden, and when it is shared: Specialization vs. mentorship from cross-cultural and evolutionary perspectives**

*Aaron D Lightner, Cynthiann Heckelsmiller, Edward H Hagen<[aaron.lightner@wsu.edu](mailto:aaron.lightner@wsu.edu)>*

Formal evolutionary models show that the low fitness cost of social learning alone cannot explain why culture is adaptive. Evolutionary theorists have therefore focused on revising theories about cultural knowledge acquisition, for example, by investigating how social learners use prestige and other cues to guide who they should learn from. Nevertheless, in many cases, specialists do not share their knowledge, but use it to provide a service for payment. In part 1 of this study, we analyzed data from 55 nonindustrial cultures about expertise in conceptual domains, such as medicine and botany. We found evidence for two broad types of experts: prestigious teachers who shared their knowledge, and specialists who used hidden knowledge to provide services to clients. Teachers often provided solutions for common problems, such as subsistence, whereas specialists provided solutions for uncommon and serious problems, such as inexplicable illnesses. In part 2, we expanded formal models of social vs. individual learning strategies to include two new parameters: how likely a challenge to fitness is to arise (common vs. uncommon), and how high the fitness penalty is for maladaptive behavior (serious vs. unserious). We then included two additional strategies: “knowledge specialists” who pay high costs for acquiring expertise, do not transmit knowledge, and assist clients for payment, and “clients” who are individual

learners and who, based on availability, pay specialists for assistance. We show that these new strategies are mutually beneficial, generally outperform social and individual learners, and are especially advantageous when problems are uncommon and serious.

## Session 12: Friday, July 2<sup>nd</sup> 1:10pm-2:10pm EDT

### *Post-Doctoral Award Competition*

#### **Increasing population densities predict decreasing fertility rates over time: A 174-nation investigation**

*Rotella, Amanda; Varnum, Michael EW; Sng, Oliver; Grossmann, Igor <[a.rotella@kingston.ac.uk](mailto:a.rotella@kingston.ac.uk)>*

Fertility rates have been declining worldwide over the past fifty years, part of a phenomenon known as “the demographic transition.” Prior work suggests that this decline is related to population density. In the present study, we draw on life history theory to examine the relationship between population density and fertility across 174 countries over 69 years (1950 to 2019). We find a robust association between density and fertility over time, both within- and between-countries. That is, increases in population density are associated with declines in fertility rates, controlling for a variety of socioeconomic, socioecological, geographic, population-based, and female empowerment variables. We also tested predictions about environmental boundary conditions. In harsher living conditions (e.g., higher homicide or pathogen rates), the effect of increased population density on fertility rates was attenuated. The density-fertility association was also moderated by religiousness and strength of social norms, where the relationship between density and fertility was attenuated in countries with high religiosity and strong social norms. We discuss why and when changes in population density may influence fertility rates and the broader implications of this work.

#### **Why Hunt? Why Gather? Why Share?: Hadza Self-Assessments of Foraging and Food-Sharing Motive**

*Stibbard Hawkes, Duncan; Smith, Kristopher; Apicella, Coren<[duncan.stibbard-hawkes@durham.ac.uk](mailto:duncan.stibbard-hawkes@durham.ac.uk)>*

The adaptive motivations underlying hunter-gatherer food acquisition choices and food-sharing have been extensively debated. Proposed motivations include self- and family-provisioning, reciprocity, tolerated theft and pro-social- or skill-signaling. However, few studies have asked foragers directly and systematically about what motivates their foraging and sharing decisions. We recruited 110 Hadza participants and employed a combination of free-response, ranking and forced-choice questions to do just this. We found that in free response tasks participants most often gave outcome-oriented foraging motives (e.g., ‘to get food’) and moralistic sharing motives (e.g., ‘I have a good heart’), but several participants also mentioned theory-derived motives. In ranking tasks, participants gave precedence to reciprocity as a motive for sharing food beyond the household. There were small but real gender differences in foraging motive, in line with

previous predictions: women were more likely than men to rank family-provisioning highly whereas men were more likely than women to rank skill-signaling highly. However, the relative importance of different motivations was similar across genders and skill-signaling, sharing and family-provisioning were the most important motivators of foraging activity for both men and women. Peer complaints and requests for food ranked very low in all tasks. Researchers have often avoided self-assessments of motive. We reflect on the reasons for this and ask whether researchers should give more precedence to self-report data.

### **Honest signaling in academic publishing**

*Tiokhin, Leo; Panchanathan, Karthik; Lakens, Daniel; Vazire, Simine; Morgan, Thomas; Zollman, Kevin <[leotiokhin@gmail.com](mailto:leotiokhin@gmail.com)>*

Academic journals provide a key quality-control mechanism in science. Yet, information asymmetries and conflicts of interests incentivize scientists to deceive journals about the quality of their research. How can honesty be ensured, despite incentives for deception? Here, we address this question by applying the theory of honest signaling to the publication process. Our models demonstrate that several mechanisms can ensure honest journal submission, including differential benefits, differential costs, and costs to resubmitting rejected papers. Without submission costs, scientists benefit from submitting all papers to high-ranking journals, unless papers can only be submitted a limited number of times. Counterintuitively, our analysis implies that inefficiencies in academic publishing (e.g., arbitrary formatting requirements, long review times) can serve a function by disincentivizing scientists from submitting low-quality work to high-ranking journals. Our models provide simple, powerful tools for understanding how to promote honest paper submission in academic publishing.

### **Session 13: Friday, July 2<sup>nd</sup> 2:20pm-3:40pm EDT**

#### *Fitness Interdependence and Social Behavior*

#### **Functional Interdependence Theory: Adaptations for Perceptions of Interdependent Situations and Relationships**

*Balliet, Daniel; Gerpott, Fabiola; Molho, Catherine; Columbus, Simon; Matej, Tiffany <[d.p.balliet@vu.nl](mailto:d.p.balliet@vu.nl)>*

Functional Interdependence Theory proposes that a reoccurring feature of the human ancestral past was that people experienced a great variety of interdependent situations with others. There could be fitness benefits associated with detecting the type of interdependence people experience in a situation and using that to condition behavioral strategies. Interdependence can vary along four dimensions, and it may be that people can perceive situations (and relationships) along these dimensions. Across several studies involving US samples using MTurk ( $n = 629$ ), a British sample using Prolific ( $n = 300$ ), and a Dutch sample using a panel agency ( $n = 562$ ), we have found that people can reliably differentiate situations along three of these dimensions (mutual

dependence, corresponding-versus-conflicting outcomes (i.e., conflict), and asymmetry of dependence (i.e., Power)). Moreover, people can use these dimensions to describe differences between a variety of social relationships (e.g., acquaintances, friends, romantic partners, and family). We used experience sampling methods and sampled over 22,000 situations in daily life and found that most situations people experience in Dutch society are characterized as containing medium-to-high amounts of mutual dependence, corresponding interests, and equal power, which is more similar to how people perceive a stag hunt situation compared to a prisoner's dilemma, and is associated with a high likelihood of mutual cooperation. An ability to perceive differences in interdependent situations and relationships could enable people to make better partner choices, condition behavioral strategies, and adapt to a broad range of ecological conditions which vary according to interdependence.

### **Cooperating to show that you care: costly helping as an honest signal of fitness interdependence**

*Barclay, Pat; Bliege Bird, Rebecca; Roberts, Gilbert; Számadó, Szabolcs <[barclayp@uoguelph.ca](mailto:barclayp@uoguelph.ca)>*

Social organisms often need to know how much to trust others to cooperate. Organisms can expect cooperation from someone who depends on them (i.e., fitness interdependence), but how do individuals assess fitness interdependence? Here we extend fitness interdependence into a signaling context: costly helping behavior can honestly signal the strength of fitness interdependence, such that those who help are trusted more. We present a mathematical model in which agents help others based on their fitness interdependence, and recipients use that information to assess whom to trust. At equilibrium, helping is a costly signal of interdependence: helping is worthwhile for those who value the recipient (and thus will repay any trust), but is not worthwhile for those who do not value the recipient (and thus will betray the trust). Recipients demand signals when they value the signalers less and when the cost of betrayed trust is higher; signal costs are higher when signalers have more incentive to defect. Signaling systems are more likely when the trust games resemble Prisoner's Dilemmas, Stag Hunts, or Harmony Games, and are less likely in Snowdrift Games. Furthermore, we find that honest signals need not benefit recipients, and can even occur between hostile parties. By signaling their interdependence, organisms benefit from increased trust, even when no future interactions will occur.

### **Reciprocity Creates Fitness Interdependence, Or Why You Should Help Even When Anonymous**

*Pleasant, Aleta; Barclay, Pat <[apleasan@uoguelph.ca](mailto:apleasan@uoguelph.ca)>*

Why are people willing to help friends at a cost to themselves, even if the friend may never know or pay it back? Reciprocal relationships may deepen over time into ones characterized by stake (aka fitness interdependence). These relationships are inherently valuable, giving an incentive to help beyond direct exchange. First, we demonstrated this using a mathematical model: individuals who help a cooperative partner outperform those who do not, even when help is given anonymously without

repayment, because they keep partners well enough to continue cooperating. We subsequently tested this in an online experiment, where partners could engage in reciprocity prior to an anonymous opportunity to help ( $N = 478$ ). As predicted, people were more willing to anonymously help cooperative (but not uncooperative) partners when help increased the probability of future interactions with the partner, compared to when help only increased the partner's earnings ( $OR = 5.09$ ). Additionally, when help increased survivability it was more often provided to cooperative partners relative to uncooperative ones ( $OR = 4.50$ ). In experiment 2 we replicated these findings ( $N = 594$ ): participants anonymously helped cooperative partners when it increased their survivability relative to when it increased their final earnings ( $OR = 5.56$ ), and when help increased survivability it was more often provided to cooperative partners relative to uncooperative ones ( $OR = 4.46$ ). Together, these results provide theoretical and empirical support that reciprocity creates stake in a partner, and this stake provides an incentive to help, absent expectations of repayment, or knowledge of the deed.

### **How is the COVID-19 pandemic affecting cooperation and interdependence?**

Ayers, Jessica D.; Beltran, Diego Guevara; Alcock, Joe; Baciu, Cristina; Claessens, Scott; Cronk, Lee; Hudson, Nicole M.; Miller, Geoffrey; Tidball, Keith; Winfrey, Pamela; Zarka, Emily; Todd, Peter M.; Aktipis, Athena <[idayers@asu.edu](mailto:idayers@asu.edu)>

Do crises bring people together or pull them apart? Here we examine how people's willingness to help others and their perceived interdependence with others changed during the COVID-19 pandemic, and assess what factors are associated with these changes. We collected data from two longitudinal cohorts during the pandemic, starting on March 6th, 2020 and lasting through October 2020. At each timepoint, participants reported on their perceived interdependence with neighbors and fellow citizens, their beliefs about helping others being the right thing to do, and their willingness to help others. We see that participants believed their shared fate with their neighbors increased over time. We also see interesting patterns when our participants rated their interdependence with their neighborhood over time – our participants became less willing to help their neighbors and had less need-based attitudes towards their neighbors, but their empathetic engagement with their neighbors did not change over time. However, we find that most perceptions of interdependence with all of humanity did not change across the course of the pandemic (shared fate, willingness to help, need-based attitudes) – however, empathetic engagement with all of humanity decreased over time. Taken together, our results suggest that crises, such as the COVID-19 pandemic, have target specific implications for interdependence. We may feel more shared fate with those who directly influence day-to-day outcomes but may feel less inclined to help them if their actions during the crisis put us at risk.

### *Mate Choice & Relationship Maintenance*

#### **Testing Mate Choice Hypotheses in a Transitional Small Scale Population**

Boothroyd, Lynda; Jucker, Jean-Luc; Thornborrow, Tracey; Tovee, Martin; Batres, Carlota; Penton-Voak, Ian<[l.g.boothroyd@dur.ac.uk](mailto:l.g.boothroyd@dur.ac.uk)>

Tests of theories of mate choice often rely on data gathered in White, industrialised samples and this is especially the case for studies of facial attraction. Our understanding of preferences for sexual dimorphism is currently in flux and a number of hypotheses require testing in more diverse participant samples. The current study uses opportunistically gathered facial dimorphism preference data from c.300 residents of 5 villages in an ethnically diverse region of rural Nicaragua, and an additional sample from the national capital Managua. Participants verbally reported demographic data, and indicated preferences for five male and five female pairs of faces manipulated to differ in sexually dimorphic facial structure based on a sample of Salvadoran individuals. We identified hypotheses drawn from sexual selection theory, and from more recent approaches which consider the impacts of economic development and cultural ‘modernisation’ on mate preferences. Hypotheses were pre-registered along with analysis code as part of a registered report (AHBP; <https://psyarxiv.com/456wg/>). Specifically, we tested the potential impacts of: ethnic group (with implied cultural differences in sociosexual attitudes), participant age, relationship status, socioeconomic status, media access, and the size and development level of the village or community. Results showed that while urban participants showed a preference for more feminine female faces, this preference was not evident in the rural participants. Neither urban nor rural participants showed any directional preference for masculinised/feminised male faces. Furthermore, there was no support for any other pre-registered hypothesis. I will conclude by discussing the implications for cross-cultural understandings of human mate choice.

### **Committed or Calibrated? Assessing Commitment Device and Relationship Maintenance Models of Love**

*Gelbart, Benjamin; Walter, Kathryn; Conroy-Beam, Daniel<[Bgelbart@ucsb.edu](mailto:Bgelbart@ucsb.edu)>*

Human long-term pair-bonding is cross-culturally pervasive but zoologically unusual. Although romantic love is central to these bonds, its function and evolved design are surprisingly mysterious. One popular hypothesis for the function of love is that love serves as a “commitment device.” In this view, feelings of love improve relationship stability by motivating those in love to foreclose on romantic alternatives. Here, we test this commitment device hypothesis against a relationship maintenance hypothesis. According to the latter view, love motivates investment in ongoing relationships and is calibrated by the availability of romantic alternatives. Across 5 studies, we find stronger support for the relationship maintenance hypothesis. In Studies 1 – 4, we find that the quality of one’s partner relative to alternatives, rather than being ignored, predict feelings of love, and this relationship is mediated in part through feelings of relationship satisfaction. In Study 5, we replicate the relationship between the quality of one’s partner relative to alternatives and love across 44 countries, suggesting cross-cultural regularities in romantic love’s functional design. The results suggest that love is less blinding than is commonly assumed and call for further investigations into the function and design of romantic love.

### **The (Bidirectional) Associations Between Romantic Attachment Orientations and Mate Retention Behavior in Male-Female Romantic Couples**

*Barbaro, Nicole; Weidmann, Rebekka; Burris, Robert P.; Wünsche, Jenna; Bühler, Janina L.; Shackelford, Todd K.; Grobb, Alexander<[n.barbaro.psych@gmail.com](mailto:n.barbaro.psych@gmail.com)>*

Attachment orientations of anxiety and avoidance are associated with many important romantic relationship outcomes. An evolutionary perspective has informed research on the associations between attachment orientations and mate retention behaviors, which individuals perform to retain their romantic partner and maintain their relationship. In the current article, we report two dyadic studies ( $n = 104$ , United States;  $n = 978$ , Germany, Switzerland, Austria) that evaluated: (1) whether bivariate associations between attachment orientations and mate retention domains are replicable; (2) whether an individual's attachment orientation predicts their partner's mate retention behaviors; and (3) whether, over time, mate retention behaviors predict attachment orientations within couples. Results of both studies replicated previous bivariate associations between attachment anxiety and cost-inflicting mate retention behaviors. Longitudinal dyadic data from Study 2 demonstrated that cost-inflicting mate retention behaviors, specifically, can be predictive of future attachment anxiety in romantic partners. These results contribute to the emerging body of research on the associations between attachment orientations and mate retention behaviors, and suggest an important (bidirectional) role of attachment anxiety in predicting negative partner-directed behaviors in romantic relationships.

### **Competitive nonverbal flirting among women, the tactics used and their perceived effectiveness**

*Wade, Joel; Fisher, Maryanne; Clark, Elizabeth<[jwade@bucknell.edu](mailto:jwade@bucknell.edu)>*

Prior research indicates that women can be indirectly aggressive with other women in order to gain access to high quality mates. Adaptively women use flirtation to attract mates. Flirtation involves indicating to potential mates that one is interested in dating/spending time with them. But, since many women may be signaling a potential mate in a given setting, flirting can involve intrasexual competition. No research has examined how women compete nonverbally with a target woman to attract a man. Two studies were implemented to ascertain: the nonverbal actions women use to competitively flirt with other women, and the perceived effectiveness of said actions. Study 1 included 91 women (aged 18 to 58) who nominated 11 consensus actions (eye contact, dancing in his line of sight, smiling at him, touching him, giggling at his jokes, butting in between the other woman and the man, showing distaste for her, brushing against him, hugging him, flirting with other men, waving). In Study 2, 116 participants (18 to 93) rated the effectiveness of the actions. Actions that suggest possession, i.e., Tie-signs (Afif & Johnson, 1994, 2005; Morris, 1995), were expected to be perceived as most effective. The most effective actions were: touching him, initiating eye contact, hugging him, giggling at his jokes, and butting in. These findings are discussed in terms of prior research.

### ***Skill & Knowledge Ontogeny in Subsistence Societies***

## **Playing with fire: cross-cultural use of storytelling to encode pyrotechnological knowledge**

*Michelle Scalise Sugiyama <[mscalise@uoregon.edu](mailto:mscalise@uoregon.edu)>*

For all of our species' existence, survival has depended heavily on knowing how to make and use fire: besides heat, light, and cooking, fire is used to deter predators, drive game, preserve food, manage plant resources, repel insects, make tools, send signals, and heal wounds. This raises the question of how fire knowledge is stored and transmitted in forager societies. Evidence indicates that storytelling is a mnemonic system used by oral cultures—including foragers—to encode important local knowledge. If true, given the importance of fire, we would expect to find pyrotechnological knowledge encoded in forager oral tradition. Specifically, (1) we would expect fire to be a common theme across forager narrative, and (2) we would expect fire stories to encode information regarding (a) materials suitable for making fire, (b) where to find them, (c) how to ignite them, (d) the uses of fire, and (e) how to use fire properly. To test these predictions, a study sample was generated by searching collections of traditional forager narratives for fire origin stories, which were analyzed for the presence of the predicted information. Results indicate that fire stories typically encode knowledge relevant to the control and use of fire, and may be a statistical universal.

## **Cultural change reduces gender differences in mobility and spatial ability among forager-pastoralist children, the Twa of northern Namibia**

*Helen Elizabeth Davis, Jonathan Stack, and Elizabeth Cashdan<[helendavis@fas.harvard.edu](mailto:helendavis@fas.harvard.edu)>*

A fundamental cognitive function found across a wide range of species and necessary for survival is the ability to navigate complex environments. It has been suggested that mobility may play an important role in the development of spatial skills. Despite evolutionary arguments offering logical explanations for why sex/gender differences in spatial abilities and mobility might exist, thus far there has been limited sampling from non-industrialized and subsistence-based societies. This lack of sampling diversity has left many unanswered questions regarding the effects that environmental variation and cultural norms may have in shaping mobility patterns during childhood and the development of spatial competencies that may be associated with it. Here we examine variation in mobility (through GPS tracking and interview), performance on large-scale spatial skills (i.e. navigational ability), and performance on small-scale spatial skills (i.e. mental rotation task, Corsi blocks task, and water-level task) among Twa forager/pastoralists children whose daily lives have been dramatically altered since settlement and the introduction of government funded boarding schools. Unlike previous findings among Twa adults, both boys and girls (N=88; aged 6-18) show similar patterns of travel on all measures of mobility. We also find no significant differences in spatial task performance by gender for large or small-scale spatial skills. Further, children performed as well as adults did on mental rotation, and outperformed adults on the water-level task. We discuss how children's early learning environments may influence the development of both large and small-scale spatial skills.

## **The life history of learning subsistence skills among Hadza and BaYaka foragers from Tanzania and the Republic of Congo**

*Sheina Lew-Levy, Erik J. Ringen, Alyssa N. Crittenden, Ibrahim A. Mabulla, Tanya Broesch, Michelle A. Kline<[sheinalewlevy@gmail.com](mailto:sheinalewlevy@gmail.com)>*

Aspects of human life history and cognition, such as our long childhoods and extensive use of teaching, theoretically evolved to facilitate the acquisition of complex tasks. The present paper empirically examined the relationship between subsistence task difficulty and age of acquisition, rates of teaching, and rates of oblique transmission among Hadza and BaYaka foragers from Tanzania and the Republic of Congo. We further examined cross-cultural variation in how and from whom learning occurred. Learning patterns and community perceptions of task difficulty were assessed through interviews. We found no relationship between task difficulty, age of acquisition, and oblique transmission, and a weak but positive relationship between task difficulty and rates of teaching. While same-sex transmission was normative in both societies, tasks ranked as more difficult were more likely to be transmitted by men among the BaYaka, but not among the Hadza, potentially reflecting cross-cultural differences in the sexual division of subsistence and teaching labor. Further, the BaYaka were more likely to report learning via teaching, and less likely to report learning via observation, than the Hadza, possibly due to differences in socialization practices.

## **Age profiles of ethnobiological knowledge in off-grid pastoralist Choyeros (Baja California Sur, Mexico)**

*Eric Schniter, Shane J. Macfarlan, Juan Garcia, Gorgonio Ruiz-Campos, Diego Beltran, Brenda Bowen, & Jory Lerback<[eschniter@gmail.com](mailto:eschniter@gmail.com)>*

We investigate whether age profiles of ethnobiological knowledge (about plants and animals) are consistent with predictions derived from life history theory about the timing of productivity and reproduction. Life history models predict complementary knowledge profiles developing across the lifespan for men and women as they experience changes in embodied capital and the needs of dependent offspring. We evaluate these predictions using an ethnobiological knowledge assessment tool developed for an off-grid pastoralist population, known as Choyeros, from Baja California Sur, Mexico. We found that children prioritized acquisition of knowledge about dangerous and edible things. As a result, most dangerous or edible plants and animals are known by early adulthood, while knowledge of other plants and animals continues to develop well into adulthood. As the demands of offspring accumulate for parents with age, adults continue to develop subsistence-relevant ethnobiological knowledge to meet their children's needs. After controlling for vision, many post-reproductive adults show the greatest ethnobiological knowledge. These findings extend our understanding of the evolved human life history by illustrating how changes in embodied capital and the needs of dependent offspring predict the development of men's and women's ethnobiological knowledge across the lifespan.

## **Poster Presentations**

\*\* finalists for the Poster Award presenting at the Poster Finalists Flash Talks Session

### **Does Men's Facial Sexual Dimorphism Affect Male Observers' Selective Attention?**

*Albert, Graham; Wells, Erika; Arnocky, Steven; Liu, Chang Hong; Hlay, Jessica, K; Hodges-Simeon, Carolyn, R <[grahama@bu.edu](mailto:grahama@bu.edu)>*

Facial sexual dimorphism affects observers' physical dominance ratings. Here, we test the effects of facial sexual dimorphism on men's selective attention, while reducing the effects of demand characteristics by testing for an attentional bias towards task-irrelevant masculinized men's faces. In Experiment 1, forty-five men completed a Posner Cueing Paradigm in which they classified shapes, presented either right or left of center screen after a masculinized or feminized man's face was presented in either the same or opposite location. Participants were faster to classify the shape following the presentation of a masculine face; however, they were not faster when a masculine face cued target position. In Experiment 2, forty-four men completed a Flanker Task in which they judged letter orientation (i.e., upright, or upside-down), while ignoring flanking faces. Participants' reaction time was not affected by Morph Type (i.e., whether the face was masculinized, feminized or unmodified). In Experiment 3, forty-one men completed a Dot Probe Task. They were presented with two facial photographs of different Morph Types to the left and right of center screen. This was followed by the presentation of a target shape, in the location of one of the faces. Participants' objective was to classify shape orientation. Facial sexual dimorphism did not affect participants' classification speed. Overall, our results do not support our hypothesis that men selectively attend to masculinized faces when they are presented as irrelevant information. We conclude by discussing future directions for testing the effects of facial sexual dimorphism on selective attention.

### **Looking at a baby's face is not enough to elicit lipsmacking**

*Natalia Albuquerque, Juliana França, Ana Clara Varella, Marina Belli, Patrícia Izar <[nsalbuquerque@usp.br](mailto:nsalbuquerque@usp.br)>*

Face-to-face interactions are an important social regulation mechanism, especially between mother and infant. This behavior is believed to channel the affective communication between adult and offspring in human and non-human primates. Capuchin monkeys are social primates that frequently use a display called lipsmacking (LS), which is considered to be triggered by the close presence of an infant and to be related to face-to-face opportunities. Our goal was to investigate whether this display is linked to the overall chances individuals have for visual access to faces. We used 1285 videos of naturalistic focal observations of the second and ninth month of eight capuchin monkeys; total duration of 2398 minutes. The individuals belong to a wild group from Brazil. We conducted two screenings: LS and VAF (opportunities of visual access to a face). The video clips were the same for both screenings. We compared (Friedman test)

the second and ninth month for VAF ( $2\text{nd}=0.934\pm0.509$ ;  $9\text{th}=1.218\pm1.272$ ; non significant) and for LS ( $2\text{nd}=0.302\pm0.074$ ;  $9\text{th}=0.014\pm0.023$ ;  $p=0.005$ ). Moreover, we compared VAF and LS using Wilcoxon tests within the second month, within the ninth and using their summed data ( $\text{VAF}=0.959\pm0.554$ ;  $\text{LS}=0.181\pm0.086$ ) and found significant differences for all ( $p=0.01$ ). There is no difference in VAF between the studied months, however there is a clear decrease in LS. Interestingly, VAF is still frequent in the ninth month whilst LS is not. Our results suggest that the mere sight of an infant's face is not enough to elicit lipsmacking and paves the way to more in-depth investigations.

### **Representational co-existence in Muslims and Christians: Core intuitions about persons interfere with later acquired God concepts across traditions**

*Alrifai, Amel; Mermelstein, Spencer; Barlev, Michael; German, Tamsin C. <[amelalrifai@ucsb.edu](mailto:amelalrifai@ucsb.edu)>*

Theorists have suggested that the mind co-opts the evolved and reliably-developing person concept in forming mental representations of God. In line with this, studies on adult religious believers demonstrate that intuitions about persons continue to co-exist and interfere with later acquired theological beliefs about God's omniscience and omnipresence. However, this previous work has largely focused on Christian religious believers. As anthropomorphism of God is relatively common in Christianity, it is possible that the observed interference between person intuitions and theological beliefs is particular to this tradition. Thus, in the current study, we investigate whether such interference occurs in the minds of religious adherents of a religion where anthropomorphism is prohibited: Islam. Moreover, we hypothesized that individual differences in exposure to anthropomorphism predicts interference when reasoning about God/Allah. As an implicit measure of interference, Christian and Muslim participants (online sample,  $N = 221$ ) evaluated a series of statements that were consistent or inconsistent in truth value for God/Allah and ordinary people. Participants also completed a novel measure of exposure to anthropomorphism. Results revealed that both Christian and Muslim participants exhibited interference between person intuitions and theological beliefs and to the same extent. Furthermore, exposure to anthropomorphism uniquely explained individual differences in the degree of interference in both religious groups. Together, the results highlight the roles of evolved intuitions and socio-cultural inputs in shaping God concepts.

### **An Experimental Paradigm for Triggering Depressive Symptoms**

*Altman, Maxwell; Martin, Lily; Chiu, Candice; Andrews, Paul <[altmanm@mcmaster.ca](mailto:altmanm@mcmaster.ca)>*

Research on depression has long been hindered by the lack of an experimental paradigm for triggering the syndrome. Studies attempting to induce the syndrome often fail to capture the suite of feelings, thoughts, and behaviours that characterize depression. Establishing experimental control over depressive symptoms can therefore improve our etiological understanding of the syndrome. The presented studies

attempted to trigger the core symptoms of depression, and those related to rumination, in non-clinical samples of undergraduate students by using a modified Cyberball paradigm. Cyberball produces a realistic experience of social rejection, a commonly cited trigger for depressive symptomatology. Subsequent to participants' experience of social rejection, those in our Exclusion condition were provided false feedback to amplify thoughts and feelings of rejection. Participants then engaged in an expressive writing task, which was evaluated by trained, blind raters for ruminative thoughts and feelings. Finally, participants were given a dual-interference working memory task to serve as a potential indicator of whether participants were experiencing any difficulties concentrating. In participants randomly assigned to our Exclusion condition, our experimental paradigm successfully induced an increase in sadness, a decrease in happiness (anhedonia), ruminative thoughts of self-blame, worthlessness, and difficulty in concentration. The success of our paradigm suggests a promising avenue for studying depression in an experimental setting. Future studies should attempt to replicate these results with a different depressogenic trigger, and employ physiological measures to establish a further level of control.

### **\*\*What the Green-Eyed Monster Sees: Jealousy Tracks Predictions of Others' Trait Preferences**

*Ambrish, Prerna; Gelbart, Benjamin; Conroy-Beam, Daniel <[prernaambrish@ucsb.edu](mailto:prernaambrish@ucsb.edu)>*

Previous research has shown that specific rival traits, such as attractiveness and financial prospects, are closely linked to female and male jealousy, respectively. However, little research has examined the way in which these sex differences emerge. Men and women may use predictions about their partner's preferences, predictions about the preferences of the opposite sex, or simply be predisposed to respond differently to different kinds of rivals. Here, we examined these and other possibilities in a sample of Mturkers in heterosexual relationships (N=157). Participants examined profiles of hypothetical rivals and indicated their jealousy in response to hypothetical flirtation scenarios. We found that predictions regarding the preferences of one's partner and members of the opposite-sex were more strongly linked to jealousy of rivals than self preferences, self traits, or rivals' overall mate value. These results suggest that jealousy is calibrated on the basis of predictions about the preferences of actual or potential mates.

### **Intent-based morality: evidence from Colombian and Spanish children**

*Arini, Rhea; Bocarejo Aljure, Juliana; Bueno-Guerra, Nereida; Bayón González, Clara; Fernández, Estrella; Suárez, Natalia; Wiggs, Luci; Ingram, Gordon; Kenward, Ben <[rhea88bg@gmail.com](mailto:rhea88bg@gmail.com)>*

The majority of the developmental literature about the role of outcomes and intentions in moral evaluations has been conducted on English-speaking children and focused on harm and property transgressions (Hilton & Kuhlmeier, 2019). We tested instead a Spanish-speaking sample of 5- to 11-year-old children from Colombia and Spain

(N=123) employing moral scenarios involving disloyalty and unfairness. The outcome-to-intention shift in judgements of transgression severity was moral domain-dependent in Colombian but not Spanish children. Colombians judged failed intentional transgressions more severely than accidental transgressions in case of disloyalty, but not (yet) in case of unfairness. In line with cultural group selection (Richerson & Boyd, 2008), it makes evolutionary sense that children's sensitivity to intentionality develops earlier within the moral domains (e.g., loyalty) privileged by their own cultures (e.g., collectivistic culture). Regarding punishment severity, Spanish but not Colombian children began to punish failed intentional transgressions of both moral domains more severely than accidental transgressions around 8 years of age. Moreover, while punishment severity decreased with increasing age for both unfairness and disloyalty in Spanish children, in Colombian children the downward pattern was observed only for unfairness. This might indicate that selective concerns become more pronounced with development because of culture-directed learning processes. Finally, neither Colombian nor Spanish children enjoyed engaging in punishment. Colombian children in particular even anticipated punishment to feel worse than how it actually felt during and after punishment allocation. This suggests that retribution is unlikely to be the primary motive for children's punishment behaviour (Carlsmith et al., 2008).

### **Covid-19 and Moral Judgements in Turkey**

*Atar, Hande; Akçay, Çağlar; Eskenazi, Terry <[hatar20@ku.edu.tr](mailto:hatar20@ku.edu.tr)>*

Humans have evolved behavioral strategies to avoid infections that might spread from others. This behavioral immune system is reinforced by feelings of disgust which may be expressed as moral judgments. Furthermore, moral judgments also enable cooperative strategies which may help manage fast-spreading diseases such as COVID-19. In this study, we examine the relationship between morality judgments, and emotions of disgust and anger directed at COVID-19 related prevention behaviors. In an online study, participants filled out a COVID-19 Prevention Measures Scale and a Perceived Vulnerability to Disease and Germ Avoidance Scale. We also presented participants with scenarios in which the participants imagined themselves, a close relative/friend, or a stranger encountering a COVID-19 positive (or negative) person who violates prevention measures. Participants then provided a moral judgment of the behavior, as well as how disgusted and angry they felt towards it. We predicted that the harshness of the moral judgment will scale with the participants' level of closeness during the encounter with the violator. We also expected participants who practice more caution against COVID-19 to judge such violations more harshly. Finally, given that COVID-19 can spread through asymptomatic individuals, we expect that violation of prevention measures may predominantly trigger feelings of anger rather than disgust. These results will help elucidate how the behavioral immune system and moral judgments are related to each other.

### **Can't or Won't? Intentions Mitigate Violations of Reciprocal Altruism Agreements**

*Balboa, Nora J.; Brase, Gary L. <[nbalboa@ksu.edu](mailto:nbalboa@ksu.edu)>*

Previous research has documented strong emotional responses to decisions to cooperate or default in reciprocal altruism (RA) scenarios, generally consistent with theorized reactions. Whereas a prior study (Brase, 2017) left the reasons for defaulting ambiguous in hypothetical RA situations, two new studies repeated that methodology, but with the intentions of the defaulting made explicit. Study 1 (N = 202 undergraduates) used scenarios in which defaulting on an RA agreement is explicitly unintentional on the part of both parties. As hypothesized, changes from baseline of emotional ratings were smaller in these clearly unintentional contexts compared to prior results. This was true for anger, aggression, and disgust (less negative change), as well as for trust and gratitude (less positive change). Study 2 (N = 261 undergraduates) used scenarios in which defaulting is explicitly intentional. As again hypothesized, changes from baseline of emotional ratings were larger in these clearly intentional contexts compared to prior results. This was true for anger, aggression, and guilt (more negative change), as well as for trust (more positive change), and particularly notable for contexts in which only one party defaults. Exploratory factor analyses for both studies suggest that most emotions load onto three factors (positive, other-negative, and self-negative), consistent with emotions tracking broader categories of situations and self/other valuations. In sum, intentionality significantly impacts participants' emotions and judgments about the behaviors of (hypothetical) others in social interactions, and patterns found across those reactions can inform theoretical issues.

## **Scientific Niche Construction**

*Francesco Balzan; Nathalie Gontier <[francesco.balzan@studio.unibo.it](mailto:francesco.balzan@studio.unibo.it)>*

In so far as evolutionary theory has been applied to the investigation of science formation, and in line with the Neodarwinian paradigm, academia has been understood as adapting to environmental pressures (e.g., social status, market demands, economic pressures) and scientific change has therefore been understood as responding to external pressures. We propose that the study of science formation could additionally benefit from adopting a general eco-evo-devo perspective associated with the EES paradigm, where internal and self-regulating mechanisms and processes are recognized to function as cultural scaffolds that enable the active and long-term synchronization with the external environment. We deploy the newest discoveries derived from Friston's Free energy Principle account and its corollary theory (i.e. Active inference) as a translational tool to start understanding the evolution of academia as resulting from active construction. We call this process Scientific Niche Construction and its paramount feature is the ability to not only respond to current problems but to prevent future ones throughout long-term simulations and targeted modifications of our shared, cultural and scientific niche. We will end by pointing out the benefits for policy making that might stem from taking on such a paradigmatic shift.

## **A coalitional formidability assessment mechanism as distinctive evidence of human adaptation to small-scale war**

*Henrikas Bartusevičius <[henrikas@prio.org](mailto:henrikas@prio.org)>*

Have humans evolved adaptations to small-scale war? This question has generated major debate involving anthropologists, archaeologists, economists, primatologists, psychologists, and political scientists. I suggest that evidence of special design, obtained from an integrated program of psychological experiments, is required to answer this question. If humans are adapted to war, then human psychology must be equipped with specialized adaptations designed for the effective navigation of war: planning, executing, and defending against coalitional attacks. I probe the existence of such adaptations. I focus, specifically, on a coalitional formidability assessment mechanism, which likely helped ancestral humans to avoid costly fights. Such a mechanism, if revealed, potentially constitutes distinctive evidence that war shaped human evolution. The coalitional formidability assessment mechanism is probed in an adaptationist program, consisting of six goals: 1. Theorize a likely adaptive problem: How not to fall victim to a coalitional attack?; 2. Theorize an adaptation and its design features involved in solving this problem: The coalitional formidability assessment mechanism; 3. Based on the design features, postulate hypotheses; 4. Test for the existence of the design features, which tests for the existence of the adaptation itself. 5. Examine cross-cultural variation in the outputs of the adaptation and alternative explanations of results; 6. Assess whether the adaptation shapes people's attitudes and behavior today in the context of modern war. This research is part of a five-year project that has just commenced. Therefore, in this theoretical presentation, I will discuss 1–3, resulting in a computational model of the coalitional formidability assessment mechanism.

### **Makeup works by modifying factors of facial attractiveness**

*Batres, Carlota; Jones, Alex L.; Barlett, Christopher, P.; Porcheron, Aurélie; Morizot, Frédérique; Russell, Richard <[cbatres@fandm.edu](mailto:cbatres@fandm.edu)>*

Self-adornment is among the oldest and most widespread of human behaviors. From the wide variety of forms these behaviors can take, the practice of facial cosmetics has emerged in multiple cultures and is among the most prevalent. Makeup is known to increase facial attractiveness, but it remains unclear how it does so. We took a theoretically driven approach, borrowing from the rich literature on facial attractiveness and testing the proposal that cosmetics increase attractiveness by modifying five known visual factors of attractiveness: symmetry, averageness, femininity, age, and perceived health. In six studies using 152 carefully-controlled images of female target faces with and without makeup, participants rated the faces on attractiveness and each of the five factors. We then analyzed the effect of makeup on each of these factors, and whether the factors mediated the effect of makeup on attractiveness. Makeup affected all the factors. Additionally, with all five factors as mediators in a multiple mediation model, we observed full mediation of the effect of makeup on attractiveness. The finding that makeup is used in ways that manipulate underlying factors of attractiveness empirically demonstrates a link between beauty and beautification, and forms the basis for a scientific understanding of makeup.

## **Does emotional facial expression recognition and interpersonal problems differ among alcoholics in different abstinence stages?**

*Koehler, Vinícius Betzel; Tokumaru, Rosana Suemi <[betzelkv@mcmaster.ca](mailto:betzelkv@mcmaster.ca)>*

Emotional facial expression recognition (EFER) have been reported to be impaired in alcoholics . Interpersonal problems have also been reported as a major issue to this population. However, research with long-term abstinent alcoholics is scarce. We aimed at assessing the correlation between EFER and interpersonal problems of alcoholics in different stages of abstinence. We assessed EFER skills, interpersonal problems, depression and anxiety symptoms of alcoholics across three stages of abstinence, non-abstinent ( $N = 7$ ), short-term abstinent ( $N = 7$ ) and long-term abstinent ( $N = 11$ ) and controls ( $N = 8$ ). Non-abstinent alcoholics presented more interpersonal problems, especially problems related to dominance and non-assertiveness, and more depression than the other groups. However, there were no major differences on the EFER among groups. Results suggested that alcoholics interpersonal problems and EFER function independently, that non-abstinent alcoholics have more problems than alcoholics in different stages of abstinence and that interpersonal problems decrease with abstinence.

## **Sexual Opportunity or Threat? Affordance Mismatch Between Men and Women During Courtship.**

*Boyd-Frenkel, Krystina; Barlev, Michael; Neuberg, Steven <[krystina.boydf@gmail.com](mailto:krystina.boydf@gmail.com)>*

Women report unwanted sexual attention from men. Previous research suggests that, at least in part, this is because men overperceive women's sexual interest. Sexual overperception has been proposed as a proximate solution to an important evolutionary problem faced by men during courtship: minimizing the error of missing out on possible sexual opportunities. Here, we explore the proximate mechanism upstream of perceptions of sexual interest. Whereas courtship affords casual sexual opportunities for men, it affords the threat of unwanted sexual advances/assault for women. As such, we propose that men and women enter courtship with very different mindsets, and it is these mindsets that regulate their self-reports and perceptions of sexual interest. Experiment 1 ( $N = 447$  undergraduates) established the mindsets men and women enter courtship with. Men were more likely than women to attempt flirtatious behaviors (e.g., kiss) and were more likely to desire casual sex; women were more likely than men to protect themselves (e.g., bring physical protection) and to worry about their physical safety. Experiment 2 ( $N = 793$  MTurk workers) used a priming methodology to manipulate men's and women's mindsets. We find the male sexual overperception effect in a control condition and in a condition that reflects real-world mindsets (men primed with a mating motive and women primed with threat); however, there was no evidence for the effect in a configuration of primes where men and women's mindsets were reversed. In sum, these findings shed light on the proximate mechanisms underlying the male sexual overestimation bias.

## **How Do Psychopathic Men Allocate Reproductive Investment across Mating, Parenting, and Somatic Domains?**

*Brazil, Kristopher; Volk, Tony <[kb15hr@brocku.ca](mailto:kb15hr@brocku.ca)>*

Psychopathy is a personality style that describes people who are grandiose, callous, disinhibited, and engage in antisocial behavior. Past research suggests psychopathy could reflect a reproductive strategy particularly in men geared toward high mating and low parental investment. Less research has examined how the concept of somatic investment pertains to men's psychopathy. The present study explored different markers of somatic investment—accumulating resources, relationships, physical health—in addition to mating and parental investment in men's psychopathy. Young men ( $N = 253$ ) from an online community sample ages 24–35 completed questionnaires of psychopathic traits and investment domains (mating, parenting, somatic). Men's perceptions of each investment domain were then assessed with photographs of stimuli from each domain, including attractive faces (mating), baby faces (parental), and somatic activities (e.g., exercising, meeting friends). Using structural equation modeling, we explored the associations among overall psychopathy and each investment domain in model 1, and overall psychopathy and perceptions of stimuli in model 2. Results of model 1 showed that psychopathy was associated with higher mating and lower relational somatic investment, but not with parental or individual somatic investment. Model 2 showed that psychopathy was not associated with ratings of physical health somatic activities (e.g., exercising), but it was associated with more favorable ratings of both mating and parental stimuli and less favorable ratings of resource and relational somatic activities (e.g., saving money, meeting friends). The findings suggest men's psychopathy may involve less effort in some areas of somatic rather than parental investment.

## **Survival Processing Effect & Metacognition**

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Encoding information in a survival context increases retrieval of this information. We explored whether this Survival Processing Effect (SPE) is also seen in the metacognitive system. Error Management Theory (EMT) states that under uncertainty, people make decisions that minimizes the cost of making errors. We propose that the cost of being confident in memory would be less than the cost of being non-confident in a survival context. Thus, encoding information in survival context should produce higher metacognitive false alarm rates, i.e. rating an incorrect memory with high confidence. We also predict that confidence will be higher while remembering information learned in survival context compared to a non-survival context. In Study 1 participants rated words for relevance in a survival context or a moving context. In a surprise recognition test, participants chose the words they have previously seen and provided confidence ratings for their choice. Surprisingly, the results did not reveal an effect of survival processing, possibly due to a ceiling effect. Participants had higher metacognitive false alarm rates in the survival condition, but not higher confidence in their responses. In Study 2, we

increased the difficulty of our recognition task, by increasing the number of new words given. In Study 2, we found a robust survival processing effect but no effect of survival processing on metacognitive false alarm rates. Together, these results suggest that survival processing may not affect metacognitive processes in expected direction.

### **Women's preference for sexual dimorphism in male face shape: A meta-analytic review**

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From an evolutionary perspective, the perception of attractiveness evolved as a mechanism to guide the individuals' mate choices. One of the phenotypic traits believed to advertise mate quality is sexual dimorphism of face shape. However, studies show mixed results regarding the effect of facial masculinity on male attractiveness. To help obtain a clearer picture of what is presently known about heterosexual women's preferences, we conducted a systematic review and a meta-analysis to explore the association between sexually dimorphic face shape and male attractiveness. Overall, 225 articles passed the initial title, keyword and abstract revision. One hundred and twelve studies were considered eligible for the systematic review. Lastly, 11 articles passed a second and narrower set of criteria, hence entering the meta-analysis. The systematic review revealed that 62% of the studies used two-alternative forced-choice and rating paradigms. Also, relationship context, ovulatory cycle, relationship status and pathogen disgust were the four main variables that were measured/manipulated alongside sexual dimorphism. In the meta-analysis, we found a globally non-significant effect (CI 95% 0.44, 0.50, Chi<sup>2</sup> p=0.01, I<sup>2</sup> = 97%), suggesting that preferences for masculinized (or feminized) face shapes do not differ significantly from chance. This work confirmed the inconsistency in the evidence for attraction to sexually dimorphic shape features in male faces, with no clear female preference for either masculinity or femininity. Additionally, we discuss contextual and individual factors, along with studies' methodological aspects, that may have influenced the reported meta-analytic results.

### **Effects of Parental and Personal Factors on Birth Control Use under the Genetic Influences of 5-HTTLPR among Adolescents**

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The purpose of this study was (a) to examine relationships between parental influences and personal attributes on birth control use and (b) to identify genetic influences on such relationships by comparing the frequencies of common genetic variants—short allele vs. long allele—in serotonin-transporter-linked polymorphic region (5-HTTLPR) among adolescents (N = 5,852). Multi-group Structural Equation Modeling (SEM) was employed to identify the direct and indirect relationships among factors. Results showed there were direct effects of personal attributes on birth control use within the framework of the Theory of Planned Behavior (TPB) model,  $\chi^2 = 134.011$  (df = 53,  $p < .01$ ), CFI = .991, RMSEA = .023, WRMR = 1.122. Adolescents who perceived their parents as

more disapproving of sex values were less likely to use birth control ( $b = -.124$ ,  $p < .05$ ) during their most recent sexual intercourse, while those who perceived their parents as having more positive attitudes about birth control use ( $b = .316$ ,  $p < .05$ ), and who had higher self-efficacy were more likely to use birth control ( $b = .312$ ,  $p < .05$ ) at their most recent sexual intercourse. Additionally, the current study did not find effects of genetic variants of 5-HTTLPR that moderate the influences of the TPB constructs on birth control use ( $p > .05$ ).

### **Cooperative and conformist behavioural preferences predict the dual dimensions of political ideology**

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Political ideology is often measured along two dimensions, referred to as economic and social conservatism, or social dominance and authoritarianism. Here, we test the proposal that these two dimensions of political ideology reflect two unique aspects of human sociality: willingness to cooperate at a personal cost, and willingness to conform to the group and enforce group-wide social norms. We report findings from two pre-registered studies combining data on political ideology and policy views from the nationally-representative New Zealand Attitudes and Values Study with data from a comprehensive battery of incentivised behavioural tasks ( $N = 991$ ; adult New Zealand sample; mean age = 52 years, s.d. = 12 years). These behavioural tasks measure cooperative preferences, such as altruism, trust, and collective action, and conformist preferences, such as social information use, rule following, and norm-enforcing punishment. We found that cooperative preferences reflected a single underlying latent factor that was negatively related to Social Dominance Orientation and positively related to a host of economically progressive views, including support for income redistribution, support for unemployment benefits, support for taxes on the rich, and willingness to make sacrifices for the environment. We also found that conformist social information use was positively related to Right Wing Authoritarianism and socially conservative views on issues like abortion, homosexuality, and religious instruction in schools. However, we did not find the predicted relationships between punitive and rule following behaviours and authoritarianism or other socially conservative views. These findings reveal how evolved cooperative and conformist preferences continue to shape our political differences even today.

### **Perception of well-being in pet owners during COVID-19 lockdown in Uruguay**

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Dogs and cats are domesticated animals usually kept for companionship. Human-Animal Bond is a close, mutually beneficial relationship. It can improve human well-being, as suggested by recent research. COVID-19 pandemic forced people to stay at home. We asked dog and cat owners from Uruguay if they perceived change in their

Emotional State (ES) and Quality of Life (QL) and Relationship-bond (R/B) with their pets during confinement, using an online questionnaire that was answered by 1000 respondents. Regression analyses using R were conducted. We found a 10% improvement of ES among respondents living in suburbs-rural area during quarantine compared to people living in the city. Dog owners reported 38% more ES than non-pet owners and showed higher ES than cat owners. Taking care for dogs requires higher energy levels than taking care for cats offering additional physical exercise opportunities. Respondents who perceived an improvement in the behavior of their pets were more likely (14%) to perceive a positive effect of the pet on their QL. Pet ownership was associated with higher perceived quality of life (5%) among respondents who lived alone. Reported improvement of R/B was associated with higher perceived ES in 92% of the respondents. It is notable that most of respondents (98%) perceived improvement of R/B with their pets during the quarantine. Our results suggest that living with pets may be beneficial regarding well-being in confined conditions.

### **Is “Social Venting” an Effective Means of Indirect Aggression?**

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When an actor shares their frustrations about a target to someone, they might frame their message as “venting” rather than as overt denigration. If venting feels good, this can suggest that venting helps actors achieve their goals (Kenrick et al., 2010; Krems et al., 2017). What goal(s) might venting facilitate? Contrary to intuition, venting does not seem to alleviate anger in a cathartic manner (Bushman, 2002). Rather, venting appears similar to a form of indirect aggression—reputation derogation—whereby an actor’s gossip about a target harms target reputation (e.g., Buss & Dedden, 1990; Reynolds, 2018). Theories claim a major benefit of indirect aggression is that it (a) harms target reputation while also (b) allowing the aggressor to seem non-aggressive (presumably helping the aggressor avoid retaliation; Bjorkqvist, 1994). Given this information, we ask: Does venting (vs. aggression) (a) harm target reputation without (b) making the actor seem aggressive? Results indicated that when venting (vs. being overtly aggressive), the actor is in fact deemed less aggressive while the target is deemed more unlikable. Furthermore, the actor is not seen as more manipulative when venting. This suggests that social venting (vs. overt social aggression) is an effective tactic: it harms the target’s reputation more and doesn’t stain the actor with a reputation for being aggressive or manipulative.

### **Unpredictability Schemas, Short-Term Mindsets, and Crime**

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Harsh and unpredictable environments are linked to crime. People in these environments might develop a belief that the world is chaotic and that people are undependable (i.e., an unpredictability schema). Therefore, they might opt to focus on the present, rather than invest in a future that is not stable or guaranteed. Crime offers

one avenue to obtaining immediate rewards. Offending is thus more common amongst those with a present orientation. We test these ideas by examining whether harsh and unpredictable environments are associated with delinquency through unpredictability schemas and short-term mindsets. To this end, we analyze two longitudinal datasets: Z-proso, survey data of 1,675 adolescents over time (ages 11-20) from a sample of 56 Zurich public schools, and the PROSPER Peers in-home dataset, survey data from a subsample of 979 adolescents over time (ages 11-17) from 28 rural/semi-rural schools in Pennsylvania and Iowa. We use preregistered structural equation models to examine the direct and indirect effects of harsh and unpredictable environments on crime. We find partial support for our hypotheses. Harsh and unpredictable environments are indirectly associated with crime. Some indirect pathways occur through both unpredictability schemas and short-term mindsets. Others occur only through short-term mindsets. Our results suggest that unpredictability schemas and short-term mindsets mediate the relationship between harsh and unpredictable environments and delinquency. We discuss the theoretical importance of these findings, which propose shared psychological mechanisms to help explain the link between many known risk factors and crime. We also discuss relevance to policy and intervention strategies.

### **Mate Retention Behavior and Ejaculate Quality in Humans**

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Males of some species use mate retention behavior and investment in ejaculate quality as anti-cuckoldry tactics concurrently while others do so in a compensatory fashion. Leivers, Rhodes, and Simmons (2014) reported that men who performed mate retention less frequently produced higher-quality ejaculates, suggesting that humans use these tactics compensatorily. We conducted a conceptual replication of this research in a sample of 41 men (18 to 33 years;  $M = 23.33$ ;  $SD = 3.60$ ). By self-report, participants had not had a vasectomy and had never sought infertility treatment. We controlled for several covariates known to affect ejaculate quality (e.g., abstinence duration before providing an ejaculate) and found no statistically significant relationships between mate retention behavior and four components of ejaculate quality: sperm velocity, sperm concentration, slow motility, and ejaculate volume. The present results provide little support for the hypothesis that human males deploy mate retention behavior and ejaculate quality investment compensatorily. We discuss the limitations of this study and highlight the need for research to address questions about the nature of anti-cuckoldry tactic deployment in humans, especially concerning investment in ejaculate quality.

### **Mate Value and Intrasexual Competition as Predictors for Anger, Narcissism, and Empathy**

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One of the main triggers that cause a jealous man's murderous rage is when a woman engages in infidelity. Mate value (MV) may mediate the degree of sexual

proprietary, which ranges from vigilance to violence. The current investigation aimed to determine how individuals expect a hypothetical man to react to a female partner's infidelity. A scenario was created to measure the expected degree of nervousness about leaving a wife alone during military deployment and degree of upset later after infidelity is discovered. Surveys were collected on Amazon Mechanical Turk (N=201 cis-gender heterosexual men). Standardized scales measured intrasexual competition (ICS), mate value, masculinity-femininity, and psychological characteristics (narcissism, empathy, and clinical anger). Most participants were very upset upon learning about hypothetical infidelity. The aim of this paper was therefore revised, and the sex competition variables and psychological scales were examined. For all three scales (clinical anger, empathy, and narcissism), MV and ICS made significant independent contributions to predicting the psychological variables. The model predicting anger using three variables was statistically significant,  $F(3,197) = 7.616$ ,  $p < .001$ . MV ( $b = -1.696$ ,  $p = .015$ ) and ICS ( $b = 3.176$ ,  $p < .001$ ) made significant independent contributions to the prediction of clinical anger. Traditional masculinity/femininity was not independently statistically significant in any of these models. These findings may add to our understanding of how and why clinical anger varies in men reacting to a hypothetical scenario of infidelity. Clinical interventions directed toward anger management may benefit men, specifically those with low mate value and high narcissism.

### **The Development of Mating Cognition across Puberty and Adolescence**

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Adolescents experience rapid growth in biology, cognition, and behaviors, which are essential for navigating social complexity within the human environment. One added complexity includes the development of romantic relationships. The onset of puberty prepares the body for biological processes of reproduction, allowing for the ability to conceive, carry, and rear offspring. It follows that maturing cognitive and affective systems develop concurrently to support reproductive competence, transitioning the mind towards identifying and maintaining mating relationships. To date, however, there are very few investigations into the development of mating cognition through puberty and adolescence from an evolutionary perspective. This commentary proposes ways in which the development of social cognitive mechanisms also support the emergence of a mating-focused mentality in adolescent youth. Hormonal and neurological influences on social cognition during adolescence are discussed, followed by more focused assessments of research investigating (1) face perception, (2) mentalizing, and (3) emotional regulation/executive control. How these processes support the advancement of mating cognition across adolescence will be highlighted.

### **\*\*Subtle versus Magnificent: Examining Religious Practices among Tibetan Population by using Costly Signaling Theory**

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Hypothesis: Anthropologists use Costly Signaling Theory to explain the cost displays across societies seemingly unexplained by the standard evolutionary models. Numerous empirical studies have revealed that individuals convey their commitment to their social group, impart the qualities of being a reliable partner through behaviours wasting expenditure. Herein, we collected data of varies religious practices from daily subtle and persistent practice to infrequent magnificent distant pilgrimages in a typical agricultural Tibetan village where the religious practices are myriad. We predict that residents who invest more in religious practices are more likely to be nominated as having various prosocial qualities by their peers. We predict that the investment to grand distant pilgrimages has more efficacy than the persistent but subtle religious acts on recognition of prosocial qualities. Methods: Demographic data was investigated from 121 households of 557 individuals, the specific religious practice and reputational nomination are chronicled by 289 individuals through in-depth ethnographic interview. Data Analytic Approach: we use hurdle models to explore the influence of subtle and grand religious investment respectively on the number of receiving nominations. Four models were built, differentiated by the reputational quality considered (Devout; Generous; Hardworking; Good Character respectively). We model the reputational nomination ties to examine the effect of the religious costs using exponential random graph models. Conclusions: We found that religious practice is mediated by demographic factors like economic rank, age and the gender. Model specification shows that the daily subtle and persistent practices, as well as the grand, infrequent practices are both significantly associated with the nomination of devoutness. The higher scores of distant pilgrimages, the higher possibilities of the local villagers being nominated as having the prosocial qualities.

### **Specificity versus generality: a meta-analytic review of the association between trait disgust sensitivity and moral judgment**

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Individual differences in disgust sensitivity have been associated with harsher moral judgments (disgust - immorality association), however, the degree to which this association displays disgust type specificity (or generality) and moral domain specificity (or generality) is unclear. To clarify this, a multilevel meta-analysis was conducted on 512 effects ( $N = 72,443$ ). Main analyses revealed a significant overall mean disgust-immorality association ( $r = .23$ ). Additionally, moderator analyses revealed significant specificity in disgust type and moral domain: effects were stronger for (a) sexual disgust compared to pathogen disgust, (b) sanctity moral judgments compared to other domains of moral judgments, and (c) sexual-sanctity associations than other disgust type-moral domain pairings. We discuss the theoretical implications of these findings and make recommendations for the study of disgust and morality.

### **\*\*The Cultural Evolution of Imaginary Worlds in Fictions**

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Imaginary worlds are one of the hallmarks of modern culture. They are present in many of the most successful fictions, be it in novels (e.g., Harry Potter), films (e.g., Star Wars), video games (e.g., The Legend of Zelda), graphic novels (e.g., One piece) and TV series (e.g., Game of Thrones). This phenomenon is global (e.g., the emergence of xuanhuan and xanxia genres in China), and massive (e.g., the worldwide success of Lord of the Ring). We propose that imaginary worlds in fictions co-opt exploratory preferences. Imaginary worlds are fictional superstimuli that tap into the human's evolved interest for unfamiliar and potentially rewarding environments. This hypothesis can explain the cultural success of specific artefacts, such as maps in fictions, and the cultural distribution of such fictions across time, space and individuals. Notably, this hypothesis makes predictions that rely on previous research in psychological and behavioral sciences on exploratory preferences: 1) fictions with imaginary worlds should be more appealing for individuals higher in Openness to experience, 2) such fictions should be more attractive for younger people and 3) such fictions should be more successful in more economically developed societies. We successively tested these predictions with two large open-collaborative datasets, namely IMDb (N=85,855 films) and Wikidata (N=96,711 literary works), and with the Movie Personality Dataset, which aggregates averaged personality traits and demographic data from the Facebook myPersonality Database (N=3.5 million). We provide evidence that the appeal for imaginary worlds relies on our exploratory psychology.

**\*\*Dangers & Strangers: Fear of SARS-CoV-2 and ethnocentric orientations during the first European curfews**

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The COVID-19 pandemic has highlighted the role of behavioral science to understand a population's reaction to a common threat. Further, the varying trajectories of the pandemic allow studying the effects of acute environmental stress in a real-life setting. Here, we identified predictors of perceived threat as the spread of SARS-CoV-2 was on the rise and strict governmental regulations were introduced throughout Europe. We additionally examined if the pandemic influenced ethnocentric orientations, since previous research has postulated effects of environmental stress on ingroup/outgroup thinking. Participants (N=533) from Austria, Poland, Spain, and Czech Republic were asked to complete weekly questionnaires during the first curfews (<https://osf.io/db4px/>). Robust machine-learning models were trained to predict fear and ethnocentric orientations based on the interplay of interpersonal variables and environmental conditions. We find that fear of the virus can be predicted at high accuracy taking variables such as perceived infectability, germ aversion, and infections in the immediate social sphere into account, whereas 'macro-level' environmental variables had no predictive value. In contrast, we find no predictors of ethnocentrism, or systematic differences in ethnocentric orientations over the course of the curfews. Cumulatively, these results emphasize the importance of 'micro-level' psychological factors when predicting fear of the virus. Furthermore, our results do not support the hypothesis that

higher environmental and perceived threats predict identification with narrower ingroups. The findings are discussed in the context of the open debate on the influence of environmental stress on human psychology, and might inspire further research during this unprecedented global pandemic.

### **Adaptive Memory: The Association of Survival-related Auditory Stimuli and Neutral Images**

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Humans are evolutionarily tuned to recall survival-related stimuli more readily than other types of information, suggesting an encoding and recall advantage (Nairne et al., 2007). Moreover, survival-related information is even more advantageous compared to modern-threat (Weinstein et al., 2008). The current study aimed to investigate whether survival-related auditory stimuli could increase the recall of experimentally associated neutral stimuli (Preregistered: <https://osf.io/kgced/>). We predicted that survival-related sounds would increase the recognition rate of paired neutral pictures more than modern-threat and neutral sounds. Participants rated visual complexity of neutral pictures (IAPS, Lang et al., 2005) while listening to survival-related (e.g., predator calls), modern-threat (e.g., gunfire), or neutral sounds (e.g., birds singing). After a filler arithmetic task, the recognition task followed where they listened to the sounds and selected the pictures associated with them among six choices. Fifty-one undergraduates participated in the study (19 of them were excluded due to a technical error). The results showed similarly longer reaction times (RTs) during the encoding task while listening to threatening sounds than neutral (replicating our previous study: Ergen et al., 2019, presented at HBES2019). Moreover, pictures associated with modern-threat sounds were recognized more efficiently: No differences in RTs but more accurate in recognition compared to pictures associated with neutral sounds. This study showed a similarly distracting attentional interference of survival-related and modern-threat auditory stimuli compared to neutral ones. However, only modern-threat sounds slightly increased the recognition rate of associated pictures. We will discuss in the context of proximate mechanisms that underlie the survival processing effect.

### **The Ironic Effects of Saving: Does Financial Budgeting Increase Perceptions of Resource Scarcity?**

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People often make personal budgets to distribute their available funds and manage limited financial resources. Past research has worked to establish the various benefits of creating a financial budget, such as increased control on spending decisions. However, recent studies have shown that perceptions of financial scarcity are associated with dysfunctional behaviors, including reduced physical activity, greater consumption of unnecessary calories, as well as increased cognitive load and mental preoccupation with money. Guided by insights from Life History theory, reminders of resource scarcity may have the ironic effects of increasing impulsivity and overspending

behaviors. The results of this study suggest that the act of creating a restrictive budget leads people to overperceive cues to resource scarcity in their environment. Further, these over-perceptions of resource scarcity will lead people to experience increased levels of perceived stress. Implications and potential downstream effects of these altered perceptions due to budgeting will be discussed.

### **Long-term mating orientation in men: The role of socioeconomic status, protection skills, and parental ability**

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Strategic Pluralism Hypothesis states that variation in reproductive tactics is not only between sexes but within sexes and individuals across time. From an evolutionary perspective, this variation depends on phenotypical, social, and environmental factors that shape different costs and benefits in pursuing different reproductive tactics from one individual to another. Since men's reproductive success is constrained to women's availability, their mating orientations should be conditioned by features that women prefer in them. For long-term relationships, women prefer men traits signaling resources, protection skills, and willingness to share those resources and skills with them. Using generalized linear models with experimental data taken from a Chilean population, this study aims to test if resources (measured as self-reported socioeconomic status), protective abilities (measured as upper body strength), and willingness to provide resources and protection (measured as parental ability) are related to long-term sociosexual orientation in men. Our predictions were: (1) socioeconomic status would be positively associated with long-term sociosexual orientation especially in those men that have parental abilities, (2) strength would be positively related to long-term sociosexual orientation in those men with higher socioeconomic status and parental abilities, and (3) strength will have a positive association with a short-term orientation. Our results support the first hypothesis since higher self-reported status men are more long-term-oriented. Besides, when interacting with parenting abilities, differences given by socioeconomic status disappear. Strength appears not to be significant for long-term mating orientation, even considering its interaction with other traits, but strength by itself is powerfully linked with short-term orientation.

### **In Which Environments is Impulsive Behavior Adaptive? A Cross-Discipline Review and Integration of Formal Models**

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Is impulsivity a failure of self-control or an adaptive response to harsh or unpredictable environments? Formal models help address this question by providing cost-benefit analyses across a broad range of environmental conditions. However, modelling findings have not been systematically integrated. Here we develop a conceptual

framework enabling us to organize and compare results across 30 models from diverse disciplines including psychology, biology, economics, and management. We use the amassed model results to qualitatively assess whether impulsivity is adaptive across a wide range of environmental conditions, focusing on information impulsivity, i.e., acting without considering consequences, and temporal impulsivity, i.e., preferring sooner outcomes over later ones. We find that both types are adaptive when individuals are close to a dangerous threshold (e.g., starvation), resources are unpredictable, or interruptions are common. When resources are scarce, impulsivity can be adaptive or maladaptive. Information impulsivity is also adaptive when environments are temporally either very stable or unstable, but maladaptive in-between, and when local environments are similar. In contrast, temporal impulsivity is adaptive when environments are stable over time, and when local environments differ. To end, we provide three concrete recommendations for future empirical studies. Our resulting synthesis is useful for theoreticians to see how ideas from different disciplines are connected, for formal modelers to see similarities and differences between their own models and those of others, and for empirical researchers to see which existing predictions generalize across a broad range of environmental conditions and which novel predictions can be explored.

### **Experimental induction of friendship jealousy: revisiting the effects of mental coordination in a novel context**

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Jealousy is an emotional response to the threat of losing a valued relationship. In this research, we revisit the proposal that friendship jealousy is an evolved response to the threat of someone else replacing what is unique in a friendship. Burkett (2009) found that most people identify mental coordination—responding to the world as you do—as the feature that makes their best friend uniquely valuable to them. We presented a total of 305 participants from Chile with one of three hypothetical conditions, in which their best friend i) spent most of their time, ii) shared mental coordination, or iii) spent most of their time and shared mental coordination with a new friend. We replicated the expected effect in this novel context: Friendship jealousy was evoked more strongly by the threat of losing mental coordination with a friend than by just losing time spent with their friend. We discuss the implications of these findings for understanding the evolutionary basis and psychology of friendships, as well as other close relationships, and for understanding other types of non-pathological jealousy.

### **Genetics and shared life experiences influence identity fusion: a Brazilian twins study**

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Identity fusion is defined as a visceral feeling of “oneness” with somebody or a group, and twin studies have contributed to the understanding of the factors that constitute the psychological mechanisms of identity fusion. Our aim was to study the effect of zygosity (genes) and living together or apart (shared experiences) on identity fusion among Brazilian adults: monozygotic (MZ) and dizygotic (DZ) twins, and non-twins (NT). The sample was composed by 403 individuals (126 MZ, 66 DZ, 211 NT; mean age = 31 yrs( $\pm$ 10)) who answered an online form with the “Identity Fusion Scale”, a “Zygosity Questionnaire” and socio demographic questions. The GLM Model showed a main effect of zygosity ( $F=20.849$ ;  $p<0.001$ ), in which identity fusion was higher among MZ ( $M=7.17$ ) than DZ ( $M=6.25$ ) and NT ( $M=5.64$ ). These results support the importance of sharing genes for identity fusion. Additionally, an interaction effect between zygosity and living together or apart ( $F=3.51$ ;  $p=0.031$ ) was found. For siblings living apart, the main effect result was maintained. However, considering living together, both MZ ( $M=7.33$ ) and DZ ( $M=6.88$ ) showed greater identity fusion than NT ( $M=5.5$ ), and no difference was found between MZ and DZ. This finding suggests that sharing life experiences during the prenatal period combined with living together later in life, as DZ, also affects the intensity of identity fusion. Our results are discussed regarding the evolutionary and psychological levels of analysis of social behavior.

### **Early social development of wild bearded capuchin monkeys (*Sapajus libidinosus*) from 0 to 3 years**

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In social species, social development is a fundamental aspect of the individual maturation. Social Network Analysis allows studying properties of social relationships, their patterning, and inter-individual differences. Using this tool, we aimed at studying the social development of wild bearded capuchin monkey immatures in the state of Piauí, Brazil. We recorded spatial association between the focal immature and the other group members from daily focal videos of 8 infants. We built egocentric networks based on the simple association index, throughout the first 3 years of each youngster. We measured and compared the changes in the characteristics of these networks over the first three years of life. We showed that only in the first six months of life the mother exerted a significant influence on the frequency of the youngster’s association with other individuals. In addition, more than half of the group members were present in the egocentric network in the first year of the youngster, a number that decreased to a third of the group at the end of the third year of age. The frequency of association of the youngster in the egocentric network was stable over the 3 years of life. These results suggest that the social pattern of the youngster *S. libidinosus* does not drastically change between the infancy and early youth. Furthermore, the social development does not exactly match the acquisition of independence in relation to maternal care.

### **Social Distancing from Foreign Individuals as a Disease-Avoidance Mechanism: Testing the Behavioral Immune System Theory During the COVID-19 Pandemic**

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Social distancing, which has been on everyone's minds since the start of the COVID-19 pandemic has also occupied the thoughts of social scientists during this time, as the preference for social distancing can originate from a perception of threat. One of the theoretical approaches that offer an explanation for avoidance tendencies is behavioral immune system theory. As a motivational system that aims to identify and avoid pathogens, the behavioral immune system has been shown to be triggered by social cues of a potential disease threat, such as from members of a foreign group. We present a correlational study ( $N = 588$ ; Polish sample) that was designed to test mediational models derived from behavioral immune system theory, using the COVID-19 pandemic as a source of natural disease threat. In line with our expectations, we show that i) perceived threat of disease (both the perceived vulnerability to disease and the perception of the COVID-19 threat) is positively associated with specific domains of disgust, ii) disgust predicts general feelings toward foreign individuals and iii) these general feelings determine the preferred social distance from these individuals. The results support the behavioral immune system as an important concept for understanding social distancing tendencies.

### **Does priming cuteness enhance emotional recognition?**

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Infantile characteristics (kindchenschema) readily capture the attention of adults and have been shown to influence a variety of behaviors associated with caretaking. In particular, simply viewing cute stimuli has been shown to increase behavioral carefulness in adults. Here, we investigate whether sensitivity to emotional displays is also enhanced by viewing cute stimuli. The ability to recognize emotional expressions has important implications for survival and cooperation. Failing to recognize threat-relevant emotions (anger, fear, disgust) may be particularly costly given these emotional expressions communicate a potential source of danger in the environment. Forty-three women completed a facial emotion recognition task before and after priming with cute stimuli. Ten facial identities (5 male, 5 female) were displayed with one of six emotions (threat-relevant: anger, fear, disgust; non-threat-relevant: happiness, sadness, neutral). Participants were tasked with identifying the emotional expression for each of the 60 faces as quickly and accurately as possible. Viewing cute stimuli was found to enhance sensitivity to emotional expressions generally, but was not specific to threat-relevant emotions. These results suggest that priming a caretaking mentality may enhance emotional sensitivity in addition to behavioral carefulness, at least in women.

### **Signaling creativity across the menstrual cycle.**

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The claim that females are the choosier sex is well known in evolutionary psychology, but it does not apply easily to humans. Men are even choosier when it comes to the attractiveness of a prospective mate. Due to Miller's signaling theory creativity evolved through sexual selection as a potential fitness indicator. The motivation of women to present one's creativity should then be stronger during the increased fertility, which occurs during the periovulatory period. In our study ( $N = 751$ ) we tested the creative potential of women in three phases: early follicular (menses), periovulation and luteal (premenstrual). We found positive correlation between the probability of conception and creative originality, and flexibility. We also tested arousal as a mediator of this relationship. The results of our study are discussed in terms of signaling theory, due to which women advertise their fitness with their creativity. Being original can be particularly eye-catching to a potential partner.

### **The Dark Triad and Changes in Oxytocin and Testosterone After an Empathy Inducing Video**

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The dark triad (psychopathy, Machiavellianism, and narcissism) traits are distinguished from others due to their overlapping "dark" nature. Self-reported empathy is reportedly at a deficit in each of these traits, but the literature is inconsistent (e.g., Jonason & Krause, 2013; Turner et al., 2019). In this pre-registered study, we analyzed relationships between the dark triad (DT), empathy, and hormonal reactions to empathy induction using previously collected data ( $N = 173$ , university students) from Procyshyn et al. (2020). Salivary oxytocin (OXY) and testosterone (T) were collected before and after an empathy inducing video along with other individual difference measures. Using multiple self-report measures of empathy we replicated findings of empathy deficits for both psychopathy and Machiavellianism, but not narcissism. The DT traits were not related to baseline OXY but were positively related to baseline levels of T. Individuals higher in psychopathy showed less change in OXY but more change in T after watching the empathy inducing video. As previously reported (Procyshyn et al., 2020), OXY in this sample was not related to any of the self-report empathy measures. Our findings support previous research on empathy and hormonal correlates of DT traits in domain specific, reactive situations, but raise questions about connections between salivary oxytocin, empathy and the DT traits.

### **Enhanced object location memory for snakes and the group vigilance hypothesis of yawning**

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Previous researchers have suggested that yawning may hold an adaptive social function in signaling a down regulation of arousal and vigilance. As an extension of this work, the group vigilance hypothesis predicts that the observation of yawning in others triggers neurological changes to improve the vigilance of observers in order to

compensate for the reduced alertness of the yawner. In support of this hypothesis, imaging studies indicate that sensing yawns in others activates key brain regions involved in attentional allocation to threatening stimuli, and exposure to yawning stimuli has recently been shown to selectively enhance the detection of snakes during visual search tasks. The current study, which remains ongoing, builds upon this line of research by investigating whether seeing others yawn similarly enhances the location memory of threats. This is tested by assessing how exposure to yawning stimuli alters location memory for snakes, frogs, and flowers. In a repeated-measures design, 30 undergraduate participants have thus far completed location memory tasks separately after viewing yawning and control videos. As predicted, location memory is highest for snakes. While average performance is greater after exposure to yawning videos, this manipulation does not appear to selectively enhance location memory for snakes. Consistent with the rapid thermal and neurovascular changes that occur within the actor following yawns, these preliminary findings suggest yawning signals a transient reduction of mental processing, and that sensing this action in others functions to preserve group vigilance via initial threat detection rather than the spatial tracking of threats over time.

### **Women's Language of Aggression?**

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Might women have a “secret” language of aggression? Compared to men, women are more likely to employ covert, subtle tactics of intrasexual aggression and social exclusion—in part to avoid detection and punishment. Social exclusion in particular has been considered both more beneficial for female (versus male) actors and possibly more harmful for female (versus male aggressors), and it is more common among girls and women than among boys and men. Evidence suggests one of the subtle ways women go about social exclusion is via facial expressions of emotion—specifically disgust. Here, we explore whether women’s facial expressions of disgust act as a secret language of aggression, cueing expressors’ intent to exclude same-sex others but readable only by those prospective victims (i.e., other women). In a highly-powered experiment, U.S. participants ( $N = 214$ ) reported their inferences to validated facial expressions of disgust and anger on same-sex faces. Compared to men, women view same-sex disgust (but not anger) expressions as cuing expressor intent to social exclude them. Results are consistent with this notion that female aggressors enact—and female victims are attuned to—subtle cues of impending intrasexual aggression.

### **Does the naturalistic fallacy impede students’ understanding of the evolution of human behavior?**

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The naturalistic fallacy is a common logical error whereby people infer that a behavior is “good” or “correct” because it has been favored by natural selection. While science

education research has emphasized how an individual's religious beliefs may influence the extent to which they learn and attain competence in evolutionary theory, there is little known about how general human moral reasoning, including the tendency to commit the naturalistic fallacy, hinders an individual's understanding of human behavior from an evolutionary standpoint. Using surveys conducted among students enrolled in anthropology courses at Arizona State University, we examine whether competency in understanding and avoiding the naturalistic fallacy facilitates competency in applying evolutionary principles to examine human behavior. Subjects are presented with either a module that trains students to avoid the naturalistic fallacy (experimental condition), or an unrelated reasoning fallacy (control condition), before they are all presented with a module illustrating how human behavior evolves through natural selection. Preliminary results indicate that students were able to separate conceptualization from moralization. We will present data regarding students' understanding of the process of evolution, their understanding of the naturalistic fallacy, and whether subjects who were trained to recognize the naturalistic fallacy had improved learning of evolutionary concepts of human behavior. By understanding if students commit logical fallacies when attempting to conceptualize or moralize evolution, we can better design best practices for teaching about the evolutionary foundations of our behavior.

### **Stepfather Investment and Reproductive Outcomes Among US Couples**

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Although paternal investment in humans is highly variable, many males invest heavily in offspring. Biological fathers invest more in children than stepfathers, yet stepfathers do invest in their stepchildren, possibly to gain mating access to the mother. Stepfathers are also more likely to be abusive and antagonistic towards their stepchildren than biological fathers. Most previous research quantifies the investment of stepfathers in relation to biological fathers. However, no studies have explored how investment and relationship quality influences reproductive outcomes for stepfathers. I examine how stepfathers' relationship quality with stepchildren associates with stepfathers' reproductive success (number of biological children born to the couple) by utilizing the National Survey of Families and Households longitudinal survey of American couples. I also examine how mother's financial autonomy may moderate the relationship between investment and reproductive success. Results show some evidence that stepfather investment can improve reproductive success, but these results are not particularly strong and may be difficult to interpret.

### **When Staying Home is Not Safe: An Investigation of the Attachment-Moderated Links between Stress and IPV in the Time of COVID-19**

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Intimate partner violence (IPV) is a major public health concern, with increasing rates of IPV being seen around the world during the COVID-19 pandemic. Previous research has linked the perpetration of IPV and other forms of sexual violence to aspects of

romantic attachment, with anxious/preoccupied attachment styles most often linked to higher rates of IPV. In the present study, we investigated whether event-related anxiety and depression during times of COVID-related stress predict increased IPV perpetration and whether this relationship was moderated by attachment style. Given that anxiety should function to increase activity preceding a stressful event, whereas depression should function to decrease activity following a stressful event, it was expected that higher COVID-related PTSD would activate IPV perpetration and that higher COVID-related depression would deactivate IPV and that these relationships would be moderated by insecure attachment. Our findings indicated that higher COVID-related PTSD was significantly associated with increased IPV perpetration only in securely attached individuals, whereas depression was significantly linked with decreased IPV perpetration only in securely attached individuals. Insecurely attached individuals displayed different patterns. Our findings are discussed within evolutionary frameworks of attachment and the adaptive functions of anxiety and depression.

### **How important looking trustworthy was in French political history?**

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Politicians pay attention to their image, and their face is a key part of how voters see them. The facial expressions they display can inform us on how they want to be seen. More specifically, the attributes they try to show through their facial expression, instructs us on what is valued by the voters. More than 15,900 official pictures of French MP's faces from 1906 to the last election in 2017 were collected from the French National Assembly, creating an homogeneous, continuous and exhaustive time series of faces. Perceived facial trustworthiness and dominance scores were evaluated by an algorithm previously trained on avatars generated using the model developed by Oosterhof & Todorov (2008). This study was pre-registered before analysis. We hypothesized that perceived facial trustworthiness levels increased with economic development. Using linear models, the valuation of perceived facial trustworthiness across time was assessed and the relationships with various economic data (GDPpc, mean income, unemployment, inequalities, etc.) were explored. In line with our hypothesis we found that perceived facial trustworthiness levels increased with time (for time in years,  $b=0.015$ ,  $p < 0.001$ ) and were correlated with economic data in the predicted way (e.g. GDPpc:  $b=0.48$ ,  $p<0.001$ ; national unemployment:  $b = -0.073$ ,  $p<0.001$ , these are standardized betas). These results are in line with the literature showing a relationship between economic development or socioeconomic status and social trust.

### **Does pregnancy enhance sensitivity to emotional displays of threat?**

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The ability to recognize emotional expressions has important implications for survival and cooperation. Failing to recognize emotions indicative of some form of threat (anger, fear, disgust) may be particularly costly given these emotional expressions

communicate a potential source of danger in the environment. During pregnancy, women may be especially vulnerable to environmental threats and an increased sensitivity to threat-relevant emotional displays could help prepare women for the protective demands of motherhood. Previous work has suggested that pregnant women may show enhanced sensitivity to threat-relevant emotions in late pregnancy compared to early pregnancy. The current study sought to determine if pregnancy generally increases attentional bias to threat by comparing the performance of 43 pregnant women and 45 non-pregnant controls on an emotion recognition task. Although it was predicted that pregnant women would show enhanced sensitivity to threat-relevant emotional displays compared to non-pregnant controls, no differences were observed between these groups. Women were relatively accurate at detecting anger, disgust, happiness, and surprise (all above 75% accuracy). They were relatively less adept at detecting fear and sadness (accuracy between 50% and 75%). Additional analyses did not detect any effect of pregnancy duration (in weeks) on threat-relevant emotion recognition. The current study does not support the prediction that the dramatic increases in both estrogen and progesterone that occur as a function of becoming pregnant increase sensitivity to threat-relevant stimuli.

### **How Attitudes about Casual Sex Influence Judgments of Rape Victims and Perpetrators: An Experimental Test of the Reproductive Morality Model**

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Traditionally, moral attitudes are predicted by measuring political orientation and religiosity; however, the Reproductive Morality Model (RMM) understands moral judgements toward social hot-button issues, religiosity, and political ideology through individual differences in mating strategies as a self-interested model of morality. The RMM, however, better predicts individual differences in moral judgements toward social hot-button issues. Previous research indicated that individual differences in rape myth acceptance were predicted by attitudes toward others' casual sex. The current study was an experimental test of the RMM where we manipulated the ambiguity of rape vignettes and had participants judge the culpability of victims and perpetrators. Following the logic of the RMM, we predicted an interaction between sex and ambiguity of rape vignette moderated by attitudes toward others' casual sex, such that participants who condemned others' causal sex would present no difference in judgment of victims' culpability across rape vignettes. Additionally, we predicted differences in culpability judgements, such that participants who condemn others' causal sex would present lower difference scores between judgements of victims and perpetrators compared to participants who do not condemn casual sex. Individuals pursuing a long-term strategy may be motivated to reduce the ease of casual sex in the surrounding environment. By accepting rape myths, the distinction between consensual and coercive casual sex becomes blurred and lends support to long-term mating strategies and adds evidence for a self-interested model of morality.

### **Sex Differences in Compersion for Consensually Non-monogamous Individuals**

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In the context of monogamous romantic relationships, jealousy is an emotion that functions to prevent threats to reproductive success. Because of sex differences in parental investment, men and women tend to experience jealousy differently. Men report jealousy in response to threats of sexual infidelity while women report jealousy in response to threats of emotional infidelity. However, individuals in consensually non-monogamous (CNM) relationships often report low rates of jealousy and instead high rates of compersion—a constellation of positive emotions—in response to their partner being intimate with another person. What remains unclear from previous research, however, is if there are sex differences in compersion for monogamous and CNM individuals in response to evolutionarily-relevant threats to reproductive success. As such, this study investigated individual differences in compersion for individuals in monogamous ( $n = 273$ ; 81 men) and CNM relationships ( $n = 143$ ; 57 men) in response to potential emotional or sexual infidelity. When collapsing across relationship type, men experienced higher overall levels of compersion compared to women, a finding consistent with evolutionary meta-theory. When investigating differences within the two groups, there were no sex differences in compersion between CNM individuals; however, monogamous women experienced less compersion than men in response to threats of emotional and sexual infidelity. These results provide insight into potential evolved sex differences in compersion in response to sexual and emotional infidelity. Discussion centers on theoretical implications, limitations, and future directions.

### **Behavioral Immune System amidst COVID-19: Data from Japan, US, UK, Italy, and China in 2020 and 2021**

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The behavioral immune system (hereafter, BIS) is considered to have evolved as a set of psychological/behavioral responses that prevent organisms from contracting pathogens by keeping a physical distance from possibly contaminated objects, organisms, and even persons. As such, it is proposed that BIS sometimes leads to exclusionary attitudes toward out-group members, especially those individuals from the contaminated areas/countries. In addition, it has been proposed that BIS leads to obedience to social norms because infective disease control should be done at the group/society/country level. That leads to the enhanced level of obedience to social norms on the one hand, and condemnation of those who fail to follow social norms on the other hand. In this study, we examine the above predictions by collecting data under the COVID-19 pandemic on 1) BIS indices (TDDS, PVD, POPA), 2) Exclusion towards foreign people, and 3) Praise and obedience to the nation and the governmental policies. We will report the data collected under the pandemic in five countries; Japan, US, UK, Italy, and China in March/April 2020 and March 2021. The data showed quantitative and qualitative heterogeneity in correlational patterns among the five countries. The study has been pre-registered at <https://osf.io/fx274>.

## **The psychology of followership: How does group conflict influence preferences for leaders?**

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Research suggests that humans may have evolved to use two strategies for acquiring status: dominance and prestige. Dominance is characterized by the use of intimidation and aggression to induce fear, whereas prestige involves the display of expertise and knowledge to gain admiration and respect. Studies suggest that both strategies are effective means to power and influence, despite being associated with divergent behaviors and personality correlates. Little is known, however, about follower preferences for these different kinds of leaders. Here, we address this issue in the context of group conflict. Based on adaptive followership theory, we hypothesize that followers will exhibit a stronger preference for dominant leaders when intergroup conflict is salient, because dominant leaders are more likely to demonstrate a willingness to use aggression against outgroups. We further hypothesize that followers will prefer prestigious leaders when intragroup conflict is salient, as prestigious leaders tend to be highly empathetic, and thus well-suited for conflict resolution. To test these predictions, we conducted two pre-registered studies manipulating group conflict dynamics using hypothetical scenarios, and assessed follower preferences for dominant versus prestigious leaders in each context (Ns = 250-350 per study, providing 80% power to obtain a small effect size of  $F = .20$ ). Supporting pre-registered predictions, participants reported a relatively stronger preference for dominant leaders during intergroup conflict, and a relatively stronger preference for prestigious leaders during intragroup conflict. These findings provide some of the first evidence that group conflict plays an important role in shaping follower preferences.

## **“Why did my partner post that?”: Investigating Sex Differences in Perceptions of Romantic Partners’ Self-Photo Posting Motives**

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Although research has begun investigating how social networking site use impacts romantic relationships, citing that frequency of use is typically associated with negative relationship outcomes, researchers have not yet examined whether perceptions of a romantic partner’s posting behavior may be better understood by following an evolutionary psychological framework of sex differences in jealousy. In the present study, I investigate whether men and women ( $n = 503$ ) differently perceive their romantic partners’ self-photo posting motives (i.e., sex-related or status-related) and whether those perceptions predict photo-related jealousy. Two hypotheses were generated: men will be more likely than women to perceive sex motivation (i.e., posting to signal sexual attractiveness) in response to their partners’ photo-posting, whereas women will be more likely than men to perceive status motivation (i.e., posting to signal status; Hypothesis 1), men’s perception of sex motivation will positively predict photo-related jealousy, whereas women’s perception of status motivation will positively predict photo-related jealousy (Hypothesis 2). Results indicate that men and women do not

significantly differ in perceived posting motives, though non-significant patterns emerged in anticipated directions. Analyses also reveal that both men's and women's perception of status motive, but not sex motive, significantly predicted photo-related jealousy, even after controlling for mate value discrepancy and chronic jealousy dimensions.

### **The Role of Dominance vs. Merit in Children's Resource Distributions and Social Preferences**

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Past research has shown that while young children typically allocate resources equally among third parties, they also pay close attention to merit and will even give away their own resources to a partner who has made a greater contribution (Kangisser & Warneken, 2012). Recent studies have examined how different social factors such as friendship, cultural norms, and need interact with merit to influence resource allocation (e.g Chai & He, 2017; Engelmann et al. 2021). Our study adds to this literature by contrasting merit versus dominance as possible motivations for unequal resource distribution. We tested 30 6-year-olds and 30 4-year-olds on a paradigm that first established an implicit dominance asymmetry between two agents, and then showed them making equal contributions to a joint task. Our findings reveal that 6-year-olds show a strong preference for subordinate agents, and that equal collaboration significantly reduces this preference (though not entirely). 4-year-olds did not demonstrate a significant preference for either agent at any point, and were significantly less likely to protest against inequality than 6-year-olds. Study 2 is ongoing, with the only difference being that in this paradigm the dominant agent makes a greater contribution to the joint task. Preliminary results show that this manipulation increases 6-year-olds' preferences for the dominant agent, but they are just as likely to still prioritize the subordinate. These findings demonstrate not only that children can infer a dominance asymmetry without explicit cues, but also that their social biases are malleable and can be reduced given information about merit.

### **Are the measures of social relationship quality used across the human and animal sciences truly comparable?**

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In the evolutionary study of behaviour, animal behaviour is often compared to that of human children. Though many behavioural studies of children claim to be comparable to studies of other species, there are differences in the measurements used, and no evidence that these measures are measuring the same thing. In studies of social behaviour, relationship quality is typically measured using surveys in studies of children, but with behavioural observations in studies of other species. However, until we can be certain that surveys and observations measure the same thing, it cannot be claimed that these measures are comparable. Furthermore, if these measures are not comparable, then it becomes necessary to test their predictive accuracy as measures of relationship

quality. We used children as a model species for assessing the reliability and predictive accuracy of survey and observational measures of relationship quality. We collected three measures of relationship quality between individuals in a group of school children: survey responses from teachers, survey responses from children, and observational data of children socialising. We assessed these measures as correlates of each other, and compared them as predictors of partner choice in a cooperative string-pull paradigm. While survey measures correlated highly, they did not correlate highly with observational measures, and survey measures were better at predicting partner choice than observational measures. Thus, observational measures are a necessity for studies of children wishing to be fully comparable to animal studies. However, the low predictive power of these measures must be factored into interpretations.

### **Differences in aggression among kin and non-kin**

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Several decades ago, Daly & Wilson noted that homicides were low among cohabiting biological relatives, a finding that violated previous assumptions among criminologists, but that made sense in terms of inclusive fitness. Does it follow that close relatives show generally reduced aggression toward one another? The answer depends on the type of aggression being considered. We present data from three studies ( $n=1100$ ) in which participants were asked about their moral judgements, past behaviors, and imagined scenarios involving aggression toward siblings, friends, and acquaintances. Siblings generally report much higher rates of direct aggression, but much lower rates of reputational aggression, against each other than toward non-kin. The high rates of direct aggression are not simply because of more opportunities; such aggression is also judged much more morally acceptable between siblings than between friends and acquaintances. Sibling direct aggression also violates the general pattern of sex differences, with sisters and brothers engaging in similarly high levels of direct aggression, and low levels of reputational aggression, toward one another.

### **The Interplay of Social Identity and Norm Psychology in the Evolution of Human Groups**

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People's attitudes towards social norms play a crucial role in understanding group behavior. Norm psychology accounts focus on processes of norm internalization that influence people's norm following attitudes but pay considerably less attention to social identity and group identification processes (Chudek & Henrich, 2011; Bicchieri, 2016; Gelfand, 2018; Tomasello, 2014). Social identity theory studies group identity but works with a relatively thin and instrumental notion of social norms (Hogg 2016; Scheepers & Ellemers 2019; Turner & Reynolds, 2012). We argue that to understand both sets of phenomena best, it is important to integrate the insights of both approaches. Throughout the lecture, we highlight tensions between the two approaches and

conflicting observations and sketch the contours of an integrated account. We focus on processes of internalization and suggest that internalization of social norms and internalization of social identity can be seen as two complementary processes, both playing a role in norm-governed behavior. We conclude with some observations on how a twofold account may contribute to studying the evolution of human groups and understanding behavior and social norms in complex societies. Multi-level societies are characterized by their members' ability to coordinate and negotiate between norm systems, issues that are best understood by combining the insights of norm psychology and social identity theory (Bird et al., 2019; Townsend, 2018). Moreover, we suggest that to better understand and measure normative behavior in complex societies with multiple roles, identities, allegiances, and subgroups, one must also consider the negotiation of social identities (Aureli & Schino, 2019).

### **Impulsivity Does Not Increase Fitness in Response to Childhood Environmental Harshness**

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Recently, life history theory (LHT) has been increasingly applied to psychological research on phenotypic plasticity. Griskevicius et al. (2013) revealed that individuals from low socioeconomic status (SES) families tend to be more impulsive. They consider that impulsivity reflects fast life history strategy, which is an adaptive response to childhood harsh environment. However, no studies have tested the evolvability of this reaction norm. Drawing on a mathematical model of adaptive reaction norms (Hazel et al., 1990), we hypothesized that (i) impulsivity is associated with higher fitness among those who experienced childhood harshness, while (ii) it is associated with lower fitness among those who did not experience childhood harshness. The impulsivity reaction norm can evolve only if both of these conditions hold. We measured three indices of impulsivity (temporal discounting, risk taking, fast/slow life history strategy), childhood SES, two direct indices of fitness (number of children, marriage experience) and three indices that may be indirectly related to fitness (annual household income, subjective SES, life satisfaction) of 692 middle-aged participants (40-45 years). Among the four groups median-split by childhood SES and impulsivity, none of the direct and indirect indices of fitness showed the hypothesized pattern. Impulsivity operationalized as risk-taking tendency was associated with higher fitness among individuals from high, but not low, SES families. Impulsivity operationalized as a fast life history strategy was associated with lower fitness regardless of childhood SES. In sum, we found little evidence for the evolvability of the impulsivity reaction norm.

### **\*\*Sibling Conflict Over Parental Resources: Is there an Evolved Bias in Perceived Parental Favoritism?**

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Parent-offspring conflict is expected over the “optimal” distribution of parental resources, especially when multiple offspring are simultaneously competing for these resources. Indeed, sibling conflict is common across species and has been extensively documented in humans. Here, we tested the hypothesis that people have an evolved cognitive bias to underestimate their parent’s investment in them relative to their siblings; such a bias could motivate attempts to secure additional investment. We tested the hypothesis across three studies ( $N = 2,565$ ) and found mixed results. Overall, adults report that their parents treated them fairly based on their needs and those of their siblings. However, individuals with one or more siblings who were close in age showed the predicted bias – that they did not think themselves the favorite – in Study 1, which was replicated in an independent sample in Study 3. In modern wealthy nations, sibling conflict appears to be muted but appears to intensify with siblings who are close in age and thus presumably competing for the same parental resources, and this intensification may bias perceptions over the distribution of parental resources.

### **\*\*Shame and Guilt: Intrapersonal or Interpersonal Emotions?**

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According to attributional theory, shame and guilt are intrapersonal emotions: shame is elicited when an individual attributes a negative (“identity-goal incongruent”) outcome or event to internal, stable, and uncontrollable causes, while guilt is elicited when an individual attributes a negative outcome to internal, unstable, and controllable causes (Tracy & Robbins, 2006). By contrast, the adaptationist theory posits that shame and guilt are primarily interpersonal: shame is elicited by cues of probable or actual devaluation from others (with the threat of devaluation, and thus shame, being greater when the devaluer is, e.g., intimidating), while guilt is elicited by cues that one has placed insufficient weight on the welfare of a valuable other (with guilt increasing when the harmed other is, e.g., more likeable) (Sznycer & Lukaszewski, 2019). In three MTurk studies across two cultures (The USA and India,  $n = 873$ ), we conduct critical tests between these two theories of shame and guilt. We experimentally pit the hypothesized elicitors of the attributional theory against the hypothesized elicitors of the adaptationist theory and use structural equation modeling to determine which elicitors truly trigger shame and guilt. Ultimately, we hope these data will help further our understanding of these emotions and their functions

### **Dispositional Disease Worry Predicts Perceived Infection Risk for One's Romantic Partner**

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Infectious disease has significantly impacted people’s lives and relationships; however, there has yet to be a study investigating the amount of time men and women spend worrying that their partner will get sick. In two studies, we aimed to assess how often people worry about their partner’s risk of contracting a chronic or infectious disease. In

the first study ( $n = 352$ ), adult participants were asked to report how much time they spent worrying that their partner would contract an infectious or chronic disease. We observed that higher perceived infectability predicted more concern about one's partner getting sick with an infectious disease. Additionally, gender was not a significant predictor in time spent worrying. In the second study ( $n = 444$ ), participants completed the same survey measures as the first study, with an additional item assessing how much time they spent worrying their partner would contract COVID-19. Results revealed that germ aversion, not perceived infectability, predicted worry for COVID-19.

Additionally, qualitative data revealed that the nominated reasons for concern over a partner's health were relatively similar among men and women. Results indicated that one's dispositional disease worry rather than their gender impacts their concern for their partner contracting an infectious disease and COVID-19, but not chronic illnesses.

### **Do We Always Prefer Similar Peers? Not when they are Intrexual Rivals.**

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Much research shows that people are attracted to others with similar characteristics. Drawing on an evolutionary perspective, however, we propose that although our preference towards similar targets might have been adaptive for solving challenges in the domain of affiliation, this may not be true for the domain of mate attraction. According to our research, when the salient goal was to make a new friend, people preferred same-sex individuals with similar characteristics (e.g., "fashion style") compared to individuals without similarity. However, when the salient goal was to attract a romantic partner, such preference was reversed. Overall, findings are consistent with the motivation-based account of interpersonal perception.

### **Alone Together and Angry: Misogynistic Terrorism as Intergroup Bargaining for Sexual Access**

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Not only are most mass shooters, violent extremists, and terrorists overwhelmingly male, but many of them harbor deeply misogynistic attitudes. While misogyny is a core tenet of many violent extremist movements, over the past few years, "incels" (involuntary celibates) have gathered in online communities incite violence against women. But what is the link between misogyny and mass violence against women? Attempts to answer this question have been belied by the controversial nature of the subject, on the one hand; and lack of formal theory, on the other. This is a major problem of societal proportions: misogynistic terrorism has been identified as a growing domestic terrorist threat, both nationwide and internationally. Here, I introduce a novel theoretical framework that highlights the psychological underpinnings of incel-type violence, and in so doing anchors the emergence of a seemingly modern phenomenon in our evolutionary past. On this theory, individual factors (such as low status) and broader social forces, such as high status inequality, female empowerment, and the

ease of coordination in the age of social media, can give rise to collective male violence against women.

### **Attitudes Towards Nuclear Weapons and the Impact of Partisan Framing**

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Humans are likely ill-equipped to deal with the evolutionarily novel phenomena of mass atrocities like nuclear strikes. Instead, the psychological mechanisms involved in reasoning about these conflicts are likely calibrated to the small-scale conflicts that characterized our hunter-gatherer past. Hence, people may rely on alliance-based heuristics, such as their political party affiliation, to guide decision making in complex dilemmas. Past work has found a variety of individual differences in people's willingness to endorse the use of nuclear weapons. For instance, Slovic and colleagues (2020) found that U.S. conservatives were more likely than liberals to endorse nuclear retaliation in combat scenarios. Other work has also found that greater vigilance for certain moral foundations, including loyalty and authority, similarly predicted support for nuclear force (Rathburn, et al., 2020). The current study examines the impact of political framing on decisions surrounding nuclear action and conceptually replicates research focused on moral foundations. Participants (N = 1331; 832 undergraduates, 499 MTurkers), were presented scenarios wherein Democrats, Republicans or a neutral party proposed nuclear retaliation. Consistent with past work, Republicans were more likely to endorse nuclear retaliation. Contrary to predictions, however, framing condition match with party identity had no effect on nuclear endorsement. We did find that binding moral foundations positively correlated with nuclear endorsement, though the particular foundations varied among samples. Support for nuclear weapon use was far from the scale floor, indicating that a significant proportion of people view nuclear war as a realistic option.

### **A novel testosterone administration paradigm to compare physiologically plausible causal effects of testosterone in men and women**

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Testosterone is a key hormone in the human endocrine system, and it affects the physiology and behavior of both women and men. Acute increases in testosterone concentrations within the context of social threat influence behaviors that are relevant to survival and reproduction (e.g., mate-seeking, intrasexual competition, aggression). Experiments that manipulate testosterone concentrations are essential to assess testosterone's causal effects and its adaptive functions. For over two decades, researchers in the field of human social neuroendocrinology have been using single-dose pharmacological challenge protocols to determine the causal effects of testosterone. Most of these single-dose administration studies have so far used single-sex samples. Moreover, studies with men have increased men's testosterone concentrations within their normal physiological range, but studies with women have

typically increased testosterone concentrations to levels far above the normal physiological range for women. The purpose of this pre-registered experiment was to develop a single-dose administration protocol using intranasal testosterone that would produce a proportionally similar rise in testosterone for both sexes. Using a cross-over, within-subject (randomized and counterbalanced), double-blind design, participants (N=20, 50% women, aged 20-39) received intranasal testosterone gel (0.3mg for women, 11mg for men) or placebo. We found that these doses raised testosterone concentrations to the high normal physiological range for each sex, producing similar dose-response curves in both sexes. This paradigm will allow researchers to (1) design studies that test physiologically plausible sex differences/similarities in the causal effects of testosterone, and (2) examine the possible adaptive functions of acute increases in testosterone in both sexes.

**\*\*Can romantic feedback influence socio-political attitudes? An experimental test of the effects of dating popularity**

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Romance might seem trivial to other spheres of people's life, especially their politics. Instead, research has shown that trait mate value can covary with some socio-political attitudes. However, mate value is often context-dependent. Can changes in self-perceived dating popularity (i.e., a measure of self-perceived mate value in the mating market) cause shifts in people's socio-political attitudes? In this experiment, we manipulated young heterosexual participants' (N=237, 62% women, single, aged 18-25) popularity among five peers of the opposite sex and tested the effects on participants' socio-political attitudes (self-reported attitudes towards traditional gender roles, casual sex, minimum wage and healthcare, and implicit sexual and political attitudes). Each participant was randomly assigned to getting either positive or negative romantic feedback from each of the five peers, resulting in a number of negative (positive) feedback videos from 0 to 5. Men who received more rejections (and thus fewer positive responses) from opposite-sex peers were significantly less supportive of casual sex than men who received fewer rejections. This effect was mediated by men's positive affect; more rejections decreased men's positive affect, which in turn decreased their support for casual sex. We found that a decrease in positive affect due to more rejections also decreased men's support for increasing the minimum wage and access to healthcare. There were no significant main effects on women. Overall, these results show that men are more attuned to their dating popularity than women, and that changes in positive affect due to romantic feedback influence men's, but not women's, socio-political attitudes.

**Sex, Weight and Gestational age differences in immediate postpartum behavior: a Brazilian naturalistic study**

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Infants communicate from birth, through gaze, voice, facial expression, gestures, and touch. The aim of this study was to verify whether newborn characteristics such as sex, weight and gestational age influence mother and newborn behavior in the immediate postpartum period. For this, we analyzed 120 videos of mother-infant interaction, 60 recorded in the immediate postpartum and other 60 recorded about twenty minutes after delivery. Behaviors were coded every ten seconds focused on: a) infant: motor activity, cry, soothing and open eyes; b) mother: affectionate touch, smile, talking and looking at the baby. Multiple ordinal regressions revealed that male infants cried more (OR = 3.77 p<0.01) and were more difficult to calm down (OR=0.19; p<0.01) than female infants. Mothers caressed more and talked more to male (OR = 4.605; p<0.05) than to female infants. The higher the newborn's weight the greater the chance of remaining calm (OR = 1.002; p<.,05). The higher the gestational age less likely mothers were to vocalize to their infants (OR=0.545; p<0.05). These results showed the active role of the newborns from the beginning of their lives, shedding light on the complex interactions that influence their developmental trajectory since their birth.

### **The role of risk perception, social norms and identity in shaping COVID-19 attitudes and behaviors among Texans**

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As the number of deaths from COVID-19 continues to increase, it is crucial to understand how social identity and personal experiences with health impact risk perception and preventative behaviors of COVID-19. Texas has over 2.8 million reported COVID-19 cases, and recent demographic growth within Texas has contributed to increasing political and cultural diversity. For example, conservatives that express mistrust towards scientific institutions are less likely to follow preventative guidelines and express vaccine hesitancy. We are collecting data on (1) how people perceive the risk of contracting COVID-19, (2) why adherence to preventative practices may change over time, (3) and how people's injunctive and descriptive norms and social identity, as well as demographic factors, contribute to their willingness to adopt new norms. Our sample consists of 92 Texas participants collected through an online subject pool (MTurk). We include measures of demographics, identity, risk perception, and general attitudes and beliefs regarding COVID-19 to determine which factors may influence preventative behavior. We predict that higher levels of perceived risk will increase engagement in preventative practices. We also predict less compliance with preventative practices over time as people become fatigued from the duration of the pandemic. Lastly, we predict that people with strong social identities will likely follow community leader COVID-19 recommendations. This project is part of a larger ongoing cross-cultural project that examines peoples' beliefs, behaviors, and attitudes of COVID-19. It will provide insight into how health organizations can increase engagement in preventative practices through targeted concerns.

### **Examining Pathogen Disgust and Associated Social Biases in Medical Professionals**

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Pathogen avoidance is associated with a variety of social psychological biases such as negative attitudes toward people displaying heuristic cues associated with disease and greater endorsement of moral values that fortify the boundaries between ingroup and outgroup. However, existing research has largely relied on convenience samples. The present research examined pathogen avoidance and associated biases in a sample of medical professionals (and compared them to control participants). Medical professionals are a unique population because they are frequently exposed to disgust-eliciting stimuli and pathogen sources. Consequently, we predicted that medical professionals would demonstrate lower pathogen disgust (but not sexual or moral disgust) relative to participants not working in medical fields. We additionally explored whether the associations between pathogen disgust and (1) negative evaluations of a fictitious immigrant group, (2) outgroup categorization of elderly targets, and (3) endorsement of the binding moral foundations would be moderated by career group. Consistent with predictions, medical professionals ( $N = 163$ ) reported lower pathogen disgust but, surprisingly, higher moral disgust than non-medical professionals ( $N = 74$ ). Consistent with past literature, social biases toward immigrants and in outgroup categorization of elderly targets were positively associated with pathogen disgust. Pathogen disgust was also associated with greater endorsement of the binding moral foundations. However, none of these associations were moderated by career group: pathogen disgust was associated with social biases in medical professionals and the general public.

**\*\*Infants use bowing as a cue to represent legitimate leadership**

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Research suggests that infants can distinguish between fear-based social power (bullying) and respect-based social power (leadership). However, it is unknown what cues infants use to represent legitimate leadership. To find out, we started by asking whether the act of bowing (which both matches the respect and deference displays found across cultures, and the prostration cues for subordination found across species) suffices in generating representations of leadership. We tested this hypothesis by assessing whether 21-month-olds expect agents to obey a character if they have previously bowed for it. In Experiment 1, infants saw three geometric agents bowing to a character who responded with a hint of a bow. Next, the character instructed the agents to go to bed, and they either complied while it watched but disobeyed after it left (disobedience) or continued to comply after it left (obedience). Infants looked reliably longer at disobedience than at obedience, indicating that 21-month-olds expect agents to obey a character if they have previously bowed for it. In Experiment 2, infants were presented with the same events of Experiment 1 except that the character no longer responded to the bowing. Experiment 2 replicated the finding of Experiment 1. Lastly, in Experiment 3 infants saw the same events of Experiment 2 but the agents no longer bowed to the character, but instead moved back-and-forth sideways. Now, infants no longer expected obedience nor disobedience. These findings suggest that young

toddlers expect even novel agents to keep on following the directions of individuals for whom they bowed.

### **Physical strength predicts within- and between-sex variation in anger proneness, aggressive dominance, and prestige**

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The recalibration theory of anger proposes that anger is an evolved emotion program designed to bargain for better treatment when an individual has perceived cues of undervaluation. Theoretically, having the ability to inflict costs and confer benefits upon others determines the ability to bargain cost-effectively, which will cause individuals with high degrees of bargaining power to feel angry more often. Sell et al. (2009) found positive relationships of physical strength and attractiveness with measures of trait anger proneness and aggressive bargaining. However, others have failed to replicate this finding (von Borrel et al., 2019). In our sample of undergraduates (N= 172 men and 211 women) we sought to replicate and extend previous findings by testing how measures of bargaining power relate to personality measures of anger proneness, aggressive dominance, and prestige. As predicted by the recalibration theory, physical strength was associated with anger proneness (0.21) and prestige (0.17) among men, but not women. However, strength was correlated with dominance among both men (.18) and women (.20). Moreover, bootstrapping analyses demonstrated that sex differences in anger proneness, aggressive dominance, and prestige were mediated by the sex difference in physical strength. Our findings (1) support the broad prediction that multiple behavioral strategies entailing aggressive bargaining are functionally coordinated with individual differences in bargaining power, and (2) suggest that sex differences in aggressive bargaining are partly due to strength-based calibration of behavioral strategies.

### **An Exploratory Analysis of Filicide-Suicide in Chicago, 1965-1995**

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Filicide refers to the intentional killing of a child by a parent. About half of filicides are followed by perpetrator suicide. Identifying the contexts and circumstances of filicide vs. filicide-suicide may provide insight into parental psychology. Guided heuristically by an evolutionary psychological perspective, the present study explores perpetrator sex, genetic relatedness to victim, perpetrator age, victim age, and method of killing between filicides not followed by perpetrator suicide and filicide-suicides using a database of 23,817 homicides in Chicago from 1965 to 1995. We situate the results of the current research with reference to the existing literature addressing filicide and filicide-suicide, identify limitations of the current research, and highlight several directions for future research.

### **Do Women with Children Exploit Male Sexual Psychology?**

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Across cultures humans tend to engage in a mating system called “serial monogamy” in which individuals have monogamous relationships that conclude and those individuals then re-mate with another romantic partner. Reproduction and re-mating are both prevalent among humans, suggesting that there is a significant population of single parents seeking a new mate. The current research investigates if men rate women with children as less attractive than women without children and if men will be less interested in a relationship with a woman with children than a woman without children. Participants ( $n= 711$ ), comprised of heterosexual men, responded to a survey consisting of an image of a woman and a description of her parental status (e.g., no children, 1-year-old child, 7-year-old child or 15-year-old child). Participants were asked to rate her attractiveness and their interest in a relationship with her. The results indicate that the presence of children may influence both male and female mating psychology in ways that should be further explored.

### **Early-life stress and glucocorticoid insensitivity in adulthood: an in-vitro investigation**

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Individuals differ in their sensitivity to glucocorticoids (GCs) and being insensitive to GC signaling puts one at an increased risk of experiencing chronic disease and elevated inflammation. One factor found to influence a person’s GC sensitivity is the harshness of their early-life environments, with those who grew up in stressful early-life environments experiencing increased GC insensitivity compared to those who grew up in benign early-life environments; however, existing work has primarily relied upon in vitro tests of these relationships. Building upon insights from life history theory, we provide experimental evidence that early-life stress leads to GC insensitivity in adults utilizing in vivo measures of GC sensitivity ( $N = 156$ ). In the current work, participants completed the Trier Social Stress Task or its control condition and we collected measures of salivary cortisol and intravenous pro-inflammatory cytokine levels. Results reveal that, in the stress condition, those who grew up in stressful early-life environments exhibit increased GC insensitivity compared to those who grew up in benign early-life environments. Consistent with insights from life history theory, these results indicate that the harshness of one’s early-life environments influences the development of the stress response system in ways that persist throughout adulthood. Additionally, these results provide a potential mechanistic explanation for why certain traits and behaviors associated with fast life history strategies emerge specifically under stressful conditions. Discussion of results will explore the clinical significance of these findings, along with the potential adaptive benefits of GC insensitivity to those who grew up in stressful early-life environments.

### **Secrets of sickness: The who, when, and why of concealing infectious disease**

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Current models of pathogen threat tend to presume active perceivers but somewhat passive actors (i.e., disease-relevant information exists and is just waiting for perceivers to properly detect). However, from stifling a cough to wearing extra makeup, sick actors can take steps to hide cues to their illness from others. Our work focuses on these active disease concealment decisions on the part of the actor, thereby reflecting another side to pathogen threat contexts. Across two open-ended descriptive studies ( $N = 367$ ) including both college student and community samples, we measured how frequently people report concealing sickness and in which social contexts this concealment is particularly likely. We found, somewhat surprisingly, that almost 80% of participants freely reported concealing an infectious illness in social situations at some point in their lives (study 1a). We also found that people conceal more from some audiences than others: over 50% of participants reported concealing illness from strangers, but only 25% of participants reported concealing illness from family members (study 1b). In two more studies ( $N = 307$ ) we targeted how subjective risk perceptions about giving the disease to others influences concealment behavior. Participants reported they would be less likely to conceal when their illness had a higher risk of transmission (study 2a) and when the symptoms they would pass on to others would be particularly debilitating (study 2b). This work conceptually expands the scope of traditional models of pathogen threat and offers insight into how people process risks and decisions when they are sick.

### **Disgust, Mating, and Intrusive Thoughts**

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Obsessive-compulsive disorder (OCD) is a serious psychiatric disorder, characterized by reactive (e.g., contamination concerns) and autogenous obsessions (e.g., intrusive, violent, sexual, immoral thoughts). Research has established a robust association between pathogen disgust—an emotion that evolved to facilitate avoidance of contamination—and reactive obsessions in OCD. However, little research has investigated moral disgust (in response to moral violations) and sexual disgust (facilitating avoidance of costly mates) in OCD obsessions. Moreover, research has not examined associations between OCD and socio-sexuality (the tendency toward short-term (STM) versus long-term mating (LTM) behaviors). The current study aimed to test patterns of correlation among disgust, OCD obsessions, and socio-sexuality, and to test how disgust and obsessions interact in their association with socio-sexuality.  $N=530$  undergraduates completed questionnaires on disgust, OCD, and STM and LTM.

Reactive obsessions were positively associated with pathogen ( $r=.16$ ,  $p=.001$ ), moral ( $r=.15$ ,  $p=.002$ ), and sexual disgust ( $r=.11$ ,  $p=.025$ ), but were not associated with STM or LTM. In contrast, autogenous obsessions were negatively associated with pathogen ( $r=-.15$ ,  $p=.002$ ), moral ( $r=-.23$ ,  $p<.001$ ), and sexual disgust ( $r=-.26$ ,  $p<.001$ ). Moreover, autogenous obsessions were positively associated with STM ( $r=.27$ ,  $p<.001$ ) and negatively associated with LTM ( $r=-.11$ ,  $p=.019$ ). Hierarchical linear regression indicated that sexual disgust ( $b=-0.93$ ,  $p<.001$ ) and autogenous obsessions ( $b=0.09$ ,  $p<.001$ ) predicted STM, but their interaction was non-significant. Results suggest reactive and autogenous forms of OCD are distinguished by differing associations with disgust and

socio-sexuality. Findings have implications for addressing possible functional heterogeneity within the OCD diagnostic category.

### **Evolution, Multi-partner Mating, and Sexual Ethics: A Framework for Differentiating Infidelity from Consensual Non-monogamy.**

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In monogamous relationships (i.e., exclusive courtship between two people) individuals agree that certain benefits of the relationship (i.e., sexual contact, material resources, emotional support) may only be shared within the pair-bond. Infidelity thus occurs when one partner defects from this social contract (i.e., forms an extra-pair relationship) while deceiving their partner into believing otherwise. By comparison, consensual non-monogamy (CNM) is a collection of relationship practices and structures whereby partners permit extra-pair sexual contact or intimate attachment. In this theoretical talk, we argue that infidelity and CNM share an evolved motivational framework aimed at satisfying the desire for partner variety, but that each adopts distinct sexual ethics for managing extra-pair romance that produce divergent outcomes in relationship satisfaction, conflict among partners, and personal health. To support our claims, we review empirical work that has examined how people attempt to manage conflict within CNM relationships. We discuss the role of CNM relationship maintenance practices, personality features that predispose people to CNM, and psychological and social barriers (e.g., jealousy, intrasexual competition, sexual health concerns, social condemnation) that hinder people from pursuing or maintaining CNM. Throughout, we consider how CNM, monogamy, and infidelity compare as alternative reproductive strategies, and we propose that CNM and monogamy are more stable strategies for resolving the hardships of sexual conflict compared to infidelity. We conclude by discussing our current, preregistered ([osf.io/wex2f](https://osf.io/wex2f)) international project studying how individual differences in adherence to multi-partner relationship maintenance practices predict relationship functioning among people with multiple, concurrent romantic and/or sexual partners.

### **Sickness and Sociosexuality: Acute Disease Salience Leads to More Restricted Sexual Attitudes**

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How does disease threat influence sexual attitudes and behaviors? Although research on the influence of disease threat on social behavior has grown considerably, the relationship between perceived disease threat and sexual attitudes remains unclear. The current preregistered study (analyzed N = 510), investigated how experimental reminders of disease threat influence attitudes and anticipated future behaviors pertaining to short-term sexual relationships, using an ecologically-valid disease prime. The central preregistered prediction was that experimental manipulation of disease

threat would lead to less favorable attitudes and inclinations towards sexual promiscuity. Results were consistent with this preregistered prediction, relative to both a neutral control condition and a non-disease threat condition. These experimental results were buttressed by the finding that dispositional variation in worry about disease threat predicted less favorable attitudes and inclinations towards short-term sexual relationships. This study represents the first preregistered investigation of the implications of acute disease threat for sexual attitudes.

### **Social Network and Collective Intelligence under Non-stationary Uncertain Environment: A Group Experiment and Computer Simulations**

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Objective Collective intelligence in the highly connected, uncertain world is a major topic of interests across various social and natural-science disciplines. We define “collective intelligence” as an emergent property whereby social interaction yields group-level performance superior to individual-level performance on some objectively-definable dimension. We focus on collective performance in a non-stationary uncertain environment. Specifically, we are interested in how well a group of people can track temporal changes in environment, the issue common in social foraging by animals where resource-levels of several patches may change over time. Methods We report results of a behavioral experiment with a total of 250 human participants and a computer simulation about emergence of collective intelligence in a non-stationary uncertain environment. We implemented a two-armed bandit (2AB) task in a laboratory, where the expected rewards of the two options were changing over time. We then observed how a group of 10 people could track the changes through social interaction in a centralized or decentralized network. Participants could learn how their neighbors in the network had decided in a preceding round. Results & Conclusion Results confirmed that participants in the social networks could track the environmental changes more precisely than when working alone. Yet, the overall effect of network structure was minimum. Through a series of computer simulations that used parameter values estimated from the experiment, we investigated boundary conditions in which centralized vs decentralized networks have differential impacts on the emergence of collective intelligence. Implications of these findings for network and social sciences will be discussed.

### **Dark Triad Personality Traits are Better Than Big 5 Traits At Predicting Mate Guarding and Mate Retention Behaviors in Men**

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Mate Guarding is a mate retention tactic aimed at preventing a partner from cheating and seeking potential extrapair partners. Due to potential costs incurred by reduced mate choice, individuals may resist mate guarding attempts by their partners. Although previous research revealed links between Dark Triad traits with mate retention tactics,

no research examined differential roles of Big 5 and Dark Triad traits on mate guarding and resistance to mate guarding. Utilizing a sample of college students and men recruited through Mturk ( $N = 687$ ), we used a questionnaire assessing the relationship between Big 5 and Dark Triad personality traits with Mate Guarding and resistance to mate guarding. Zero order correlations revealed each Dark Triad trait possessed stronger correlations with mate guarding and resistance to mate guarding than each Big 5 trait. Regression analyses predicting mate guarding revealed narcissism psychopathy, and openness significantly predicted Mate Guarding, although narcissism and psychopathy had much higher beta weights than openness. Regression analyses predicting Resistance to Mate Guarding revealed narcissism, psychopathy, Machiavellianism, and openness significantly predicted Resistance to Mate Guarding. These results indicate Dark Triad traits have stronger connections to Mate Guarding and resistance to Mate Guarding than Big 5 traits, supporting the idea that the Dark Triad may contribute to a wider strategy of exploitation of conspecifics. Individuals ranking higher in Dark Triad traits may prefer manipulative and aggressive tactics when preventing partners from cheating. Our research indicates Dark Triad traits may predict behaviors associated with Mate Guarding and resistance to Mate Guarding.

### **The Behavioral Immune System in the COVID-19 Pandemic: Disgust is Evoked by Unmasked Individuals and Promotes Preventative Behaviors**

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The behavioral immune system is a proposed set of psychological mechanisms designed to detect disease threats and motivate behaviors design to avoid and reduce the threat. The emotion of disgust is one of the primary mechanisms of the behavioral immune system. Disgust is consistently evoked by disease-associated stimuli and causes avoidant response patterns. The COVID-19 pandemic presents a novel context in which to test the behavioral immune system. Preventative behaviors—such as wearing a mask, washing hands, and maintaining social distance—have become widely understood. Similarly, given the virulent nature of COVID-19, unmasked individuals present a serious disease threat. An experimental study was designed to test whether unmasked individuals evoke a disgust response and, subsequently, motivate preventative behaviors. 151 participants were recruited through Amazon's Mechanical Turk and were randomly assigned to view images of an individual wearing a mask or the same individual not wearing a mask. Then, participants responded to survey items on their feelings of disgust, likelihood of engaging in preventative behaviors, as well as the Big 5 inventory. Participants who viewed images of an unmasked individual reported greater disgust to the images as well as greater disgust to the thought of someone sneezing or coughing. Additionally, conscientiousness was found to be a primary predictor of one's disgust response. Finally, feelings of disgust predicted individual likelihood of engaging in preventative behaviors in the COVID-19 pandemic, such as wearing a mask and washing one's hands.

### **Assessment of the Mate Retention Inventory-Short Form Using Item Response Theory**

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The mate retention inventory (MRI) has been a valuable tool in the field of evolutionary psychology for the past 30 years. The goal of the current research is to subject the MRI to rigorous psychometric analysis using item-response theory to answer three broad questions. Do the individual items of the MRI fit the scale well? Does the overall function of the MRI match what is predicted? Finally, do men and women respond similarly to the MRI? Using a graded response model, it was found that all but two of the items fit acceptable model patterns. Test information function analysis found that the scale acceptably captures individual differences for participants with a high degree of mate retention but the scale is lacking in capturing information from participants with a low degree of mate retention. Finally, discriminant item function analysis reveals that the MRI is better at assessing male than female participants, indicating that the scale may not be the best indicator of female behavior in a relationship. Overall, we conclude that the MRI is a good scale, especially for assessing male behavior, but it could be improved for assessing female behavior and individuals lower on overall mate retention behavior. It is suggested that this paper be used as a framework for how the newest psychometrics techniques can be applied in order to create more robust and valid measures in the field of evolutionary psychology.

### **Mere presence of co-eater automatically shifts foraging tactics toward ‘Fast and Easy’ food in humans: Toward an understanding of behavioral mechanisms**

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Many animal species, including humans, often engage in foraging with other individuals despite potential competition for food. To cope with competition, animals may adopt different foraging tactics in a group situation than when foraging alone. We hypothesized that in the presence of co-foragers, animals would shift their tactics from foraging less frequently for larger food amounts to more frequent reaching for smaller food amounts. Because smaller foods are generally more abundant in nature and allow faster consumption, such tactics should allow animals to ingest food more securely even if others attempt to scrounge it. Here, we demonstrated that humans exhibited such a shift in foraging tactics automatically, even when a co-forager was merely present but did not compete with them for food. In a laboratory setting, human participants were asked to engage in a “taste test” of potato chips paired with another participant or alone. Even though there was no competition for food in the pair condition, participants increased their frequency of reaching for food and decreased the amount of food per reach compared to the solo condition. Comparison between *Visible Pair* condition and non-social weighing revealed that the observed the behavioral shift in the *Visible Pair* condition reflected tactical responses to social foraging. The automatic behavioral shift toward more frequent reach for smaller and easier food enables secure ingestion against potential scrounging attempt by other co-foragers, and may reflect common built-in foraging tactics across many gregarious animals.

## **Testing Three Hypotheses for the Evolution of Concealed Ovulation: Predictors of Ovulatory Cue Perceptibility**

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Women may have evolved to conceal overt signs of ovulatory status. Some evidence shows that men find high fertility women to be more attractive than low fertility women, suggesting that men may be sensitive to subtle cues to fertility. However, studies have yet to explain the variance in men's sensitivity to such cues. The evolution towards concealed ovulation implies a target from which ovulation is to be concealed. If that target class is men, then men who are better able to detect ovulation may have traits that negatively impact female fitness. That is, men who are highly sensitive to ovulatory cues may have undesirable traits that the evolution of concealed ovulation was meant to deter. The present study aimed to identify what psychological variables predict men's sensitivity to ovulatory cues in an attempt to provide support for or against three hypotheses for concealed ovulation: The Paternal Investment Hypothesis, The Reduced Infanticide Hypothesis, and the Cuckoldry Hypothesis. Heterosexual men ( $n = 140$ ) enrolled at a Midwestern university completed a survey that assessed levels of various mate-market traits, which were used to predict performance on a face preference task comprised of fertile-phase and non-fertile-phase images of the same women. The three main hypotheses tested were not supported. However, sociosexuality negatively predicted preference for the high-fertility faces, in single participants only. The findings suggest that ancestral males who adopted a short-term mating strategy did not benefit from discriminating between fertile and non-fertile females. Future research directions regarding different ovulatory cue stimuli and mechanisms of cue detection are discussed. Data collection is ongoing.

## **Subjective Well-Being Among Brazilians: Before and In Times Of Covid-19**

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Subjective well-being (SWB) measures complement existing objective indicators, giving a more comprehensive picture of people's quality of life. The World Happiness Report assessed life satisfaction with the Cantril Ladder (0-10) on sample surveys carried out in 95 countries. Covid-19 led to relatively modest changes in the overall rankings, reflecting a generally shared resilience in the face of the pandemic, but it is notable that Brazil fell from position 29 in 2017-2019 to position 41 in 2020. Our aim was to examine the impact of the covid-19 outbreak on SWB in a Brazilian sample. We conducted a survey through the online application of a 31-item Multidimensional Subjective Well-Being Scale (MSWS). A sample of 808 adults answered the survey in 2018 and 123 respondents were recontacted in 2020. An independent sample ( $N=404$ ) answered the survey during the pandemic. Respondents came from the five regions of Brazil and were evenly distributed with regard to gender and age (18–30, 31–40 and 41–50 yrs). For the paired sample, a GLM Repeated Measures test revealed that Negative affect increased and Purpose of life decreased during covid-19. For the independent samples, respondents who participated in the survey during the pandemic showed lower scores

of Positive states and Spirituality. We conclude that MSWS can help us to better understand how people navigate through times of crisis, complementing analyses made with other measures such as the one presented by The World Happiness Report. Work is still in progress and soon we will have data for 2021.

### **Friendship modulates hierarchical relations in elementary schools**

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Hierarchical relationships are pivotal for social structures in human beings. Yet, little is known about mechanisms connecting social hierarchies and friendship in elementary school children. Here, we present the results of a large-scale experiment (856 children between 9 to 12 years) from 14 different elementary schools in Santiago de Chile, designed to measure social status through aggregated cooperative patterns and then explore the connection between friendship and dyadic cooperation in students with different social status. We map each classroom's cooperative network using a modified Prisoner's Dilemma in a lab in the field setting. In a networked setting of tablet computers, each student played the game in pairs with each classmate. They had to decide simultaneously how many tokens (between 0 to 10) send to their peers in each round. Thus, we proxy social status using the page rank, which considers the total number of received tokens and the sender's social position. To measure friendship, we run a peer nomination questionnaire, where students nominated up to five friends. Then, we investigate how dyadic cooperation varies according to social status and friendship. In general, we find that the more significant the difference in social status, the greater the dyadic cooperation gap, indicating acts of deference from lower-status individuals to higher-status individuals. However, when we separately analyze relationships involving mutual declarations of friendship, the association between social status and cooperation disappears. Among friends, we do not observe acts of deference from the lower status to the higher status member of the dyad. These results suggest that friendship implies fundamental equality, which is not affected by social status differences in elementary school students.

### **Cooperation as a signal of time preferences**

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Evolutionary game theory is chiefly concerned with explaining the existence of cooperation, and has rarely attended to its variable nature. Using a formal model, we show that cooperation may function as a signal of underlying individual time preferences. Our results shed light on the variability of human cooperation. In line with empirical observations, we predict that (i) future-oriented individuals should be more motivated to cooperate, (ii) future-oriented populations should have access to a wider range of cooperative opportunities, and (iii) spontaneous and inconspicuous cooperation should inspire more trust than deliberate or overt cooperation. Our theory suggests time horizon may underlie cooperative motivation in general, and even be the

inspiration for other prosocial behaviors, such as costly punishment and participation in public goods.

### **Mandemic? The role of masculinity and evolutionary risk-taking in the age of COVID-19**

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Relative to women, men expressed less worry and engaged in fewer COVID-19 safeguards, yet they have been impacted more severely (Brooks & Saad, 2020; Global Health 50/50 et al., 2021). We tested the hypothesis that men who are willing to take more risks to increase social status and mating effort could display masculinity by defying precautionary behaviors to “show off” their imperviousness to disease. Men were recruited from Amazon MTurk (N = 212 U.S. participants) and completed demographics, the Evolutionary Domain-Specific Risk Scale (Wilke et al., 2014), a measure of masculinity (Bem, 1981), and reported frequency of engaging in protective behaviors (e.g., mask-wearing and social distancing). A key result was that men were significantly less self-protective if they were more “show-off” risk-takers ( $\beta = -.21$ ,  $t(193) = -5.38$ ,  $p < .0001$ ) and the impact of “show-off” risk-taking on health behaviors significantly interacted with masculinity ( $R^2 = .23$ ,  $F(1, 193) = 4.98$ ,  $p = .03$ ). For example, at high levels of “show-off” propensity, less masculine men were less protective compared to more masculine men. This effect suggests that the lack of engaging in COVID-19 precautions could be driven by less masculine men’s desire to boost their perceived invulnerability to disease, thereby attempting to signal dominance and toughness to potential mates. Follow-up studies should investigate the role of mating strategy in the context of competitive mating environments under disease threat. Overall, our findings highlight the importance of understanding both proximate and ultimate explanations for gendered health behaviors among men.

### **\*\*Just Friends? An Evolutionary Perspective on Jealousy and Extramarital Friendships**

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Women tend to be more jealous in situations where they could lose investment or commitment from their partners compared to men who are more jealous when they could lose sexual exclusivity, consistent with evolutionary explanations. To test this idea in the context of extramarital friendships, we predicted that jealousy in response to a spouse’s new friend would vary based on the individual’s gender, the friend’s gender, and the friend’s attractiveness (since women’s mate value is based more on beauty than men’s). In the current study, we assigned married individuals to read a hypothetical scenario that varied across these three factors. Afterward, they completed the Multidimensional Jealousy scale which assesses overall, cognitive, behavioral, and emotional jealousy. The 3-way interaction was significant, but only for the cognitive subscale. We found a significant 2-way interaction between participant gender and

friend gender for all jealousy subscales. We further documented that women were significantly more jealous than men overall, consistent with our prediction. Although most prior research has focused on jealousy at the emotional level, our research shows that there are interesting gender differences across dimensions of jealousy.

### A model of psychological economics

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I analyze the optimal use of mental resources, defined as operative psychological processes aiming at triggering attention and improving the quality of decision-making, as a rational resource allocation problem typical from economics. Feelings and emotions, in particular, seem to play this role (Damasio (1994, 2003)) and natural selection must have optimized the “design” of these psychological tools in terms of adaptive fitness. The relative intensity of different feelings must therefore depend on the marginal increase on expected adaptive fitness achieved in the different social domains where feelings are employed to focus attention, so that some quantitative predictions can be formulated. A clear prediction from the model is that in those social problems such that there cannot be any gain in the probability of success because the relevant actions have already been undertaken, the optimal mental investment should be zero. This implies that anxiety, bereavement, grief, guilt and regret are useless overinvestments that seem to contradict the theory. I claim that the evolutionary purpose of these feelings might be avoiding social third-party punishments when other potential cooperators lack relevant information about the fitness returns of feelings evolved in our ancestral past. If this is true therapies oriented to consciously inhibit grief and anxiety (a classical Stoic advice) might be counterproductive depending on the particular social context.

### Disease salience predicts anti-LGB sodomy laws cross-culturally

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The current work applies the affordance management approach to explain cross-cultural avoidance of gay and bisexual men (MSM) by hypothesizing that salient disease-avoidant goals at the cultural level, as evidenced by the ecological prevalence of pathogens, should engage a pathogen-avoidance reaction, as evidenced by cultural artifacts indicating the avoidance or suppression of disease-transmitting behaviors of MSM. We used the presence of anti-gay sodomy laws at the country- and U.S. state-levels to indicate cultural artifacts aimed at suppressing the sexual behaviors of MSM and used the country-level historical prevalence of various infectious diseases, the country-level prevalence of HIV, and the U.S. state-level prevalence of various STDs to indicate cultural-levels of disease salience. Results demonstrated that, cross-culturally, the prevalence of diseases and HIV predicted a greater likelihood of adopting anti-sodomy laws, and, across U.S. states, the prevalence of STDs predicted a greater likelihood of states retaining anti-sodomy laws and a later repeal of those laws. In all, this research suggests that the salience of disease-avoidance goals, on the cultural-

level, predicts the adoption of cultural behaviors to mitigate risk of disease transmission by actively discriminating against MSM to thwart same-sex sexual behavior as mode of disease transmission.

### **Spatial memory and reasoning: The Visual Perceptions Test**

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Previous research has found that humans have a flawed perception of randomness, in which completely random sequences or patterns are often judged to show signs of aggregation. This phenomenon, referred to as hot hand, has been theorized as an evolutionary adaptation to the statistical environments in which humans evolved. As food and various resources that promote survival more often occurred in clumps (i.e., berries on a bush, flocks of birds, distribution of water sources), human cognition evolved to err on the side of the presence of such aggregations. Recently, our lab team started collecting data on human foraging behavior and search patterns using a novel Virtual Reality task. Along with the behavioral data, a series of cognitive tasks are administered to gain insight into the types of cognitive abilities that might predict efficient search behavior. The results of this thesis project aim at the inclusion of a an additional cognitive capacity measure—the Visual Perceptions Test (VPT). The VPT measures spatial memory, which we hypothesized to correlate with effective search behavior and other cognitive capacity measures originally included in our virtual reality task.

### **\*\*Development of knowledge of the environment in a population of child part-time foragers**

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Humans live in complex niches where survival and reproduction are conditional on the acquisition of knowledge. The rate at which individual knowledge is acquired depends on many factors, both physical and behavioral, such as the frequency of learning opportunities. Here, we developed a series of Bayesian latent-knowledge models to estimate individual knowledge acquisition, and to infer the influence of age, as well as of activities and social environment on such knowledge. We fit these latent-knowledge models on a set of interviews with 93 children of different ages (4 -26 years of age) from the Island of Pemba, Zanzibar, focusing on their knowledge of the local environment (animals and plants). Compared to previous studies, thanks to the use of latent models, we can describe more in detail the variation of knowledge with age as well as other factors, and explore the performance of individuals in different areas of expertise. These data and the inferred developmental pattern contribute to a growing comparative literature on children's foraging and the life history of cultural knowledge.

## **(Implicitly) against them? Examining disease avoidance motivation and implicit biases during the early COVID-19 pandemic**

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Pathogens have historically posed major threats to human survival and well-being. Humans have evolved a range of psychological defenses to protect against infection: the Behavioral Immune System (BIS). The BIS may protect by motivating the avoidance of people and social groups linked to infection threat. For example, people high in state and trait disease avoidance motivation tend to hold prejudicial attitudes against disease-linked outgroups (e.g., foreign groups) and support policies that distance these groups (e.g., immigration bans). To date, most work has focused on explicit prejudice and intergroup avoidance. The current work was designed to examine these associations using implicit measures. Mirroring past work on the BIS and explicit prejudice, we predicted that greater disease avoidance motivation would relate to stronger implicit bias against social groups that have been stereotyped as posing infectious disease threat (e.g., the overweight, elderly, disabled, Asians) but not against groups more associated with other threats (e.g., safety threats: Arab-Muslims, African Americans). In a set of pre-registered correlation and regression analyses, we examine how 1) disease avoidance motivation at trait and state levels, and 2) the interaction between state and trait disease avoidance motivation relate to IAT performance. We examine large-scale, publicly available data (<https://osf.io/y9hiq/>) collected on the Project Implicit website during the early COVID-19 pandemic. Analyses are ongoing as data are released publicly but will be presented in available detail at conference time. Results of currently existing analyses partially support the registered hypotheses.

## **Are you in control?**

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Life history theory predicts that environments marked by instability, resource poverty, social, physical and productive stress will cause individuals to become more external in their Locus of Control personality trait, since predicting outcomes is less certain. We randomly surveyed college students in 28 states at the beginning of the pandemic to assess whether their LOC was impacted by ecological factors. We found that household stress, adverse childhood experiences (ACES), and gender significantly impact Nowicki LOC measures. But only gender significantly impacted all three portions of the Levenson LOC; Internality, Powerful Others, and Chance, with ACES marginally impacting the later two constructs and health status marginally impacting Chance. In this data, men were more external across all LOC domains. While priming participants with photos only marginally affected their Levenson LOC, we found that individuals primed with serene photos were more certain about the future and were more likely to purchase half-off tickets to the future show of a favorite performer/festival than those primed with Covid-19 news images. Qualitative data highlighted a significant degree of personal uncertainty and sense of lack of control. A year into the pandemic, the project

was relaunched to compare LOC as a function of vaccine status, quarantine acclimation, and social distancing attitudes. Overall, these data indicate that there may be different psychological constructs to LOC and that ecological stress, both in the past and now, may shift individuals toward a more external locus of control, causing them to discount the future in a world of unpredictability.

### **Twin Study of Genetic Relatedness and Bereavement Related Measures: Updated Analyses and the Mediating Role of Grief**

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A Twin Loss Survey was completed by monozygotic (MZ) and same-sex dizygotic (DZ) twins following the loss of a co-twin and non-twin relatives. The sample (N=612; MZ, = 506, DZ, n=106; Males, n=185, Females, n=427) included twins whose age at loss was 15+ years to assure the development of their social relationship. Participation age was M = 47.66 (SD=15.31). Hamilton's inclusive fitness theory generated several hypotheses: (1) MZ twins should recall greater grief intensity at the time of loss than DZ twins, and (2) the loss of a twin should receive greater grief intensity ratings than the loss of a non-twin relative. It was also expected that females would grieve more intensely for deceased co-twins than males. Participants rated their grief using a Grief Intensity Scale (1=No Grief to 7=Total Devastation/Suicide Point). All hypotheses were supported: MZ>DZ: [ $t(137.48)=2.50$ ,  $p< .02$ ]; Twin>Non-Twin (except for spouse), paired t-tests,  $p< .001$ ; Female > Male [ $t(321.01) = -3.06$ ,  $p=.002$ ]. A structural equation model was estimated with Mplus 8.5 utilizing robust Full Information Maximum Likelihood estimation. The model fit well (CFI=.92, SRMR=.05, RMSEA=.06). Endogenous latent variables of preoccupation and coping were created with theoretically relevant indicators; zygosity and sex were exogenous measured predictors. Grief significantly mediated relationships between all exogenous and endogenous predictors; and grief predicted greater preoccupation and less effective coping. MZ twins and females expressed greater grief than DZ twins and males, respectively. This study enhances perspectives on bereavement by identifying associations between genetic relatedness and grief, consistent with evolutionary-based predictions.

### **\*\*Matrilineal helpers versus biological father in the evolutionary conflict over parental investment in an extended family in contemporary Brazil, Russia, and the USA.**

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Introduction. The cooperative breeding framework suggests that help from extended family members with childrearing is universal. However, alloparental help may vary between societies, families, and over time, depending on who is willing and available to help. There is currently a lack of empirical and theoretical works investigating intergenerational alloparental dynamics within the contemporary extended family,

including the analyses of matrilineal and patrilineal relatives' availability under the economic factors pressure. Methods. We analyzed the intergenerational interactions between family members during childcare in a family via Structural Equation Modeling (SEM) in R-software ("Lavaan" package). Online samples were collected from Brazil (N=605), Russia (N=302), and USA (N=308). Results. We found a robust negative impact of the poverty factor on a parental effort levels, however a prominent cultural difference in slopes estimates for the poverty paths on mother and father effort was also found. Within a structural model parental effort of both parents had shown a positive significant correlation cross-culturally, while matrilineal grandparental help was negatively affected by paternal efforts and by the number of older siblings in a family. Discussion. Complementarity in alloparental help provided by multi-generation key family members could be seen as a fundamental biosocial adaptation where different population dynamics, socio-economic structure, traditions, and individual factors adjust the family interactions in such a way that it facilitates joint cooperative efforts of a family.

### **No evidence for a tradeoff between Intelligence and Ejaculate Quality**

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Genetic quality may be expressed through many traits simultaneously, and this would suggest a phenotype-wide fitness factor. In humans, intelligence has been positively associated with several potential indicators of genetic quality, including ejaculate quality. We conducted a conceptual replication of one such study (Arden, Gottfredson, Miller, & Pierce, 2009) by investigating the relationship between intelligence (assessed by the Raven Advanced Progressive Matrices Test – Short Form) and ejaculate quality (indexed by sperm count, sperm concentration, and sperm motility) in a sample of 41 men (ages ranging 18 to 33 years; M = 23.33; SD = 3.60). By self-report, participants had not had a vasectomy, and had never sought infertility treatment. We controlled for several covariates known to affect ejaculate quality (e.g., abstinence duration before providing an ejaculate) and found no statistically significant relationship between intelligence and ejaculate quality; our findings, therefore, do not match those of Arden, Gottfredson, Miller, and Pierce (2009) or those of previous studies. We discuss limitations of this study and the general research area and highlight the need for future research in this area, especially the need for larger data sets to address questions around phenotypic quality and ejaculate quality.

### **Does the Mate Retention Inventory correspond to observable mate retention behaviors?**

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Mate retention behaviors are strongly selected for in species that suffer from infidelity and cuckoldry, which includes humans. Most mate retention studies on humans have been self-report surveys, the most notable of which being the Mate Retention Inventory (MRI-SF). Two forms of mate retention behaviors that have been found in the MRI are

proximity and touching. Using observational methods, we tested proximity and touching as mate retention tactics in couples. Couples participating in the study interacted with an attractive confederate, and their proximity and touching behaviors were recorded. Results show that proximity and touching behaviors increased while in the presence of the confederate. Couples then filled out the MRI. This increase in mate retention behaviors in the presence of a confederate correlated with the related items in the MRI.

**Encoding frequencies of ancestral dangers and foraging opportunities: Does accuracy vary with content and memory representation, and which kind of representation informs subsequent decisions?**

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Results since the 1970s show that the human mind encodes the frequency of events implicitly and with impressive accuracy, demonstrating a “striking and largely unintentional sensitivity to frequency of occurrence information” (Zacks & Hasher, 2002). But are there content effects that track evolutionarily-salient dangers and foraging opportunities? And how is that frequency information represented in memory—a continuous magnitude (there is a 30% chance I will encounter a crocodile at the riverbank), a relative frequency (I am more likely to encounter a crocodile than a log jam), or natural frequencies (15 out of 45 days there was a crocodile at the riverbank)? Giving participants experience of a simulated foraging environment—45 days at the riverbank—we assess the accuracy of frequency encoding for crocodiles (danger), abundant fish (foraging opportunity), and logjams (neutral). We compare accuracy for three different memory formats and assess which format best predicts a subsequent decision about how much time to spend fishing at the riverbank on a given day the next week. The study will be conducted online with 300 adult participants recruited through Prolific (data collection in April). The results speak to a key question in error management theory: Do we manage risk by overestimating the frequency of dangerous events or by accurately representing their frequency, with the costs of misses and false alarms entering at the decision phase?

**\*\*Examining the Relationship between Pair Stability and Fertility in Women from life course perspective: A Case Study of a Population in Botswana**

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Humans are characterized by long-term stable pair formation compared to other primates, however, cross-cultural studies have shown that pair stability varies between and within populations. The existence of variations in pair stability suggests that in some populations, long-term stable pairs may not be the optimal reproductive strategy. However, it is not clear how the pair stability leads to fertility across the individual's lifespan among high pair-instability populations, especially for women. Therefore, this study examined the relationship between pair stability on women's fertility across the individual's lifespan in a pair unstable population due to marital norms. This analysis

divides the level of pair stability into (1) short term pair stability: whether the woman changed partners after giving birth /or continued to have children with the same partner and (2) long term: the cumulative number of re-partnerships. As a measure of women's fertility, 167 birth intervals from 62 women were used in the analysis. A total of 5 months of fieldwork was conducted in Southeast Botswana. Models were fit to R Stan using the brms package. Result: changing partners after childbirth delayed the next childbirth than continuing to have a child with the same partner. Women with 3 or more cumulative re-partnerships had shorter birth intervals than women with 0,1,2 cumulative re-partnerships. Results show that the low pair stability leads to low fertility in short term but not the long term. Thus, in this group, women's fertility may improve when the pair is unstable across the lifespan.

### **Creation and investigation of a "guess the amount task" to measuring adult mentalizing reasoning**

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In order to measure higher-order mentalizing reasoning in adults, we developed a "money guessing task" based on the Indian poker game. In the game, each player is assigned a certain number that they themselves cannot see while the number was visible to other players. Players were required to guess their numbers. There were two types of cues that the players could employ: probabilistic reasoning and mentalizing reasoning of other players. Participants were university students, and each student used a computer to read and answer the assignments. The task was designed to allow the use of second-order to fifth-order beliefs when using mentalizing reasoning. The results showed that participants used mentalizing reasoning along with probabilistic reasoning rather than probabilistic reasoning alone. It was also found that third-order mentalizing reasoning was most likely to be used.

### **The Association Between Progestin Generation in Hormonal Contraceptives and Sociosexuality**

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Hormones such as estradiol, progesterone, and testosterone are important for regulating women's sexuality. However, many women take hormonal contraceptives (HCs) that disrupt the links between gonadal hormones and sexuality documented in naturally cycling women. Notably, not all HCs use the same synthetic hormones. Progestins used in HCs additionally have partial androgenic and anti-androgenic qualities that vary among progestin generations; earlier generations are most molecularly similar to testosterone and have the highest binding affinity for androgen receptors. The current research delineated between progestin generations to explore the role of progestin generation on female sexuality by examining women's sociosexual orientation (SOI) in a sample of women (N = 235) who were primarily undergraduate students. We examined whether SOI differed between naturally cycling women, women on each of the four generations of hormonal birth control pill, and women who have a

hormonal intrauterine device (IUD; second generation progestin). We hypothesized that earlier generations of progestins would be associated with less restricted SOI. Partially supporting our hypothesis, women who were using HCs containing second generation progestins (both pill and IUD) reported less restricted SOI attitudes, desire, and behavior compared to women who were using HCs containing first, third, or fourth generation progestins, as well as naturally cycling women. However, within naturally cycling women, SOI attitudes and desires tended to be higher in the periovulatory phase. Results highlight the need to understand the biological processes affected by different variations of HCs and the associated links with women's sexuality and social processes more broadly.

### **Your sickness makes me sick! - Pathogen-relevant Face Database**

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The behavioral immune system (BIS) is one of the broadly examined subjects in the evolutionary field. It aims to detect potentially threatening sources of infection by triggering emotional (disgust) and behavioral (avoidance) reactions. Visible inflammation cues or coming from a different region (inhabited by new parasites) can result in the increased social distance. As BIS can significantly influence social functioning and increase prejudice against outgroup members, its operation and regulation raise some important research questions. For the purpose of future studies, we present a new face database consisting of 96 photographs: 4 ethnicities (African, Asian, European & Latino) x 2 genders (males & females) x 6 identities (for each condition) with or without manipulation of visible inflammation cues. In the pilot study (N = 189), participants rated each photograph on likeability, attractiveness, and health. Additionally, we asked to what extent the person in the photo evokes emotions of anger, disgust, compassion, and fear. All pictures presenting fictional identities were created by AI systems.

### **Buckets of steam and left-handed hammers. The fool's errand as a signal of epistemic and coalitional dominance**

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In various professional groups, experts send rookies on absurd tasks as a prank. The fool's errand appears in factories and hospitals, in elite schools and scout camps, among soldiers, sailors, and airmen. Why are newcomers deceived and humiliated and why are fool's errands similar in structure despite various contexts and remarkably persistent over time? Here I propose that the cultural success of this social institution and its recurrent features across history and cultures are based on evolved cognitive mechanisms activated by apprenticeship as social learning and group induction. I will show that evolved mechanisms of epistemic vigilance explain how novices are reliably deceived by experts using opaque statements erroneously perceived as pedagogical. Furthermore, evolved capacities for coalition building explain why insiders use the prank

as strategic signaling of hierarchies based on epistemic asymmetry. The intersection of cognitive mechanisms and patterns of professional recruitment create a tradition where insiders coordinate to humiliate newcomers to assert epistemic and coalitional dominance.

### **Intuitive perceptions of the relationship between mating strategies and religiosity: Participant religiosity influences perceptions, but not gender**

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Recent evidence suggests that the adoption of religious beliefs and values maybe used strategically to enhance long-term mating strategies, which implies an intuitive connection between differences in mating strategy and religiosity. This connection was investigated in a two-part primary hypothesis: perception of long-term mating strategies should increase association with religiosity and decrease association with non-religiosity, while perception of short-term mating strategies should decrease association with religiosity and increase association with non-religiosity. This was studied using a novel methodology of developing two mating strategy narratives (short-term vs. long-term) constructed from a pre-established measure and exploiting the tendency to use the representativeness heuristic and conjunction error to study the intuitive links between mating strategies and religiosity. Study one served as a pilot study using undergraduates and confirmed the primary hypothesis. Studies two and three expanded on study one by using a more representative sample through a larger Qualtrics panel of participants more closely matched to the general US population and also added the variables of participant religiosity and gender to the analysis. These studies confirmed the primary hypothesis, but also demonstrated that how religiosity is described has an effect on whether or not it is associated with long-term strategies. Gender did not have an effect on the association between mating strategy and religiosity, but in study three nonreligious individuals did not associate long-term mating strategies with religiosity.

### **Erectile Dysfunction and Sexual Coercion: The Role of Sperm Competition Risk**

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Erectile dysfunction (ED) has been shown to be associated with several negative aspects of intimate relationships. Our goal for the present research was to examine whether ED was associated with men's use of sexual coercion in their intimate relationships and if perceived sperm competition risk (i.e., perceived risk of partner infidelity which may place a man's sperm in competition with the sperm from another man) played a role in this association. These associations were examined using self-reports provided by men (Study 1) and partner-reports provided by women about their perceptions of their male partner (Study 2). ED was found to have large positive associations with sexual coercion across both studies. However, men's self-reports did not provide support for sperm competition risk moderating the association between ED and sexual coercion but an exploratory analysis revealed that sperm competition risk mediated this association. Women's partner-reports provided support for sperm

competition risk moderating the association between ED and sexual coercion. In addition, an exploratory analysis found that sperm competition risk also mediated the association between ED and sexual coercion similar to Study 1. Discussion explores the implications of these results for understanding the role that sperm competition risk may play in the connection between ED and sexual coercion.

### **Pet Parenting in the United States: Investigating an Evolutionary Puzzle**

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Fertility rates continue to decline globally amidst the second demographic transition, marked by urbanization, increased educational attainment, and most importantly, a new flexibility in life-course organization. As a result, some individuals are choosing to bring companion animals into the home rather than raising children. The purpose of this study is to explore whether these transitions result in differential companion animal attachment and caregiving behavior in the homes of parents (or those who desire to become parents) and nonparents or childfree “pet parents.” A total of 917 respondents completed an online survey that included demographic questions, the Lexington Attachment to Pets Scale (LAPS), and Likert-scale questions designed to probe direct and indirect caretaking behaviors. Nonparents reported more Generalized Attachment and more Affective Responsiveness to their companion animals, as well as increased investment in General Care. They also reported more People Substituting on the LAPS. Parents and nonparents reported similar agreement regarding Animal Rights/Welfare and Training and Play. I conclude that nonparents display similar investments toward companion animals as parents display toward children, supporting the notion that nonparents may be nurturing their companion animals as a trade-off in alloparental care in this new, flexible environment.

### **Homo Empathicus or Dominatus? Evolutionary Mismatch and Male Leadership in Crisis**

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In recent years, research in organizational psychology has applied an evolutionary lens to explore the mechanisms underpinning leader selection. The evolutionary mismatch hypothesis argues that current industrialized societies are, at times, divorced from the environments in which psychological mechanisms evolved to govern leader-follower interactions. In this theoretical paper, I describe one manifestation of this evolutionary mismatch occurring between the leadership traits deemed essential during our shared Darwinian past and those believed to be effective in the modern workplace. Social dominance and its variants (e.g., aggression) were long considered critical leadership qualities that ensured group survival. Empathy and its variants (e.g., personal distress) were also necessary but for different reasons, most notably to signal solidarity between individuals and to elicit altruism. In contemporary work contexts promoting diversity and inclusion at every turn, these two antithetical qualities are expected to contribute to a paradox for the archetypal male leader role. Striking a balance between agentic and

communal behaviors not only promises to be taxing for male leaders, but it may also create confusion among their followers. While much of the leadership research promulgated by social role theorists focuses on female leaders and their struggle to reconcile dominant and empathic behaviors, little attention has been paid to their male cohort now confronted with a behavioral plasticity challenge in its leadership approach. This paper hopes to stimulate novel discussions on optimal leader selection criteria and to question the widely held notion that empathy is a panacea for all ills plaguing modern leadership.

### **Macro- and Micro-Cultural Evolution of Human Law**

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Cultural evolution of law is understudied. We propose new research methods, in this theoretical presentation, to pioneer the way to demonstrate how the macro- and micro-cultural evolution of law took place. 1) For macro-evolution, we define law as “a set of collective norms, with third-party punishment on the violators” (Wada 2017). We hypothesize that within early human hunter-gatherer group of 30 (Hill et al 2011, Lehmann et al 2014) to 150 (“Dunbar’s number”) individuals, “group laws” evolved, shared by, and transmitted to the new members of, the group by use of early, only spoken language. Based on previous research on evolution of norms (Campenni et al 2014), cooperation and third-party punishment (Helbing et al 2010, 2010 on punishment; Boyd et al 2003; Bowles & Gintis 2004 on theories; Rand et al 2011, Jordan et al 2016 on empirical research), we proceed directly to the computer simulation analysis of macro-evolution of law. 2) For the new research on micro-cultural evolution of law, we propose to accumulate database (cf. Bickel et al 2017’s “AUTOTYP” on languages and its use by Matsumae et al 2020) of early written law from Uru-Nammu Code of 2,100 B.C., of medieval Canon, Islamic law, Japanese laws of 7th-19th centuries inter alia, finally of the modern Common Law, Civil, Penal, Commercial Codes and Constitutions. The analysis of the new database, depicting what major components (cf Siems 2016) were newly introduced and transmitted where and when, in the past 4,000 years, will show the micro-cultural evolution of human law.

### **Effects of individual differences on women's preferences for masculine, bearded, male faces.**

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While masculinity and beardedness in men serve a variety of signals relevant in a mating context, women's choice in men is not only driven by these factors. Individual differences can impact women's mating strategies, and therefore the characteristics perceived as most attractive in men. In this study, we recruited 143 women to rate the attractiveness of male faces varied along dimensions of masculinity (feminised, natural, masculinised), and beardedness (clean-shaven, light stubble, heavy stubble, full beard), as either short-term or long-term partners. We then explored the effects of mate-value, competitiveness, and socio-sexual orientation on these. Results showed that regardless

of individual differences, heavy stubble was considered most attractive, and naturally-shaped faces were most attractive. When taking into account competitiveness, we found that masculinity had a larger effect on attractiveness ratings at low levels of competition, while women high in competition showed less variation in attractiveness ratings between levels of masculinity. Alternatively, beardedness had a smaller effect on attractiveness ratings at low levels of competition, while women high in competition showed more variation in attractiveness ratings between levels of beardedness. This implies that individual differences affect the value placed on particular facial characteristics in men. Other results will be discussed.

### **The Development of a Cross-Cultural Conspiracy Spreading Scale**

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Conspiracy theories are a ubiquitous feature of human groups. Believing in conspiracy theories may have served an adaptive function in ancestral environments wherein actual conspiracies (i.e., secretive and intentional acts that harm people) were common and deadly. Although research on the psychology of believing in conspiracy theories has flourished in recent decades, there is a dearth of research on the psychology of spreading conspiracy theories. The current research builds on work connecting the willingness to share political conspiracy theories to a drive to achieve dominance and to a “need for chaos”. First, I review existing work on the tendency to spread conspiracy theories. Second, I propose hypotheses related to when, why, and how people engage in conspiracy spreading. Third, I develop a measure of conspiracy spreading that can be used in cross-cultural settings. I propose four studies to develop and validate this measure. Study 1 will consist of an exploratory factor analysis of the factor structure of 38 researcher-generated items organized into five subscales (Behavior, Attitude, Desire, Emotion, and Morality). Study 2 will attempt to replicate Study 1 in an independent sample using confirmatory factor analysis. Study 2 will also test the scale’s concurrent validity by examining its correlation with two measures of conspiracy belief and need for chaos. Study 3 will investigate the divergent and criterion validity of the scale. Study 4 will investigate the scale’s known-groups validity by comparing active members of online communities related to conspiracy theories with active members of online communities unrelated to conspiracy theories.

### **Dominance, prestige, masculinity, and femininity across leadership fields**

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Although dominant masculine leaders may pose a risk to group members on account of their potential for aggression (e.g., Cheng, Tracy, & Henrich, 2010), they are sometimes valued. For example, dominant leaders are preferred in cases of intergroup/coalitional conflict (Van Vugt & Grabo, 2015; Laustsen & Petersen, 2017), and economic/resource uncertainty (Kakkar & Sivanathan, 2017). We were interested in examining how people rated the dominance (vs. prestige) and masculinity (vs. femininity) of effective leaders across contemporary leadership fields. We asked a sample of 220 college students to

spontaneously imagine an effective leader in the military, business, sports, politics, arts, or science, and rate that leader on dominance, prestige, masculinity, and femininity. All types of effective leaders were rated as above the midpoint on both dominance and prestige, but military and business leaders were rated as significantly more dominant than both arts and science leaders, and sports and political leaders were rated as significantly more dominant than science leaders. All types of effective leaders were also rated as at or above the midpoint on masculinity, though masculinity was higher among military, sports, and business leaders than among political, arts and science leaders. With the exception of arts and to a lesser extent, science leaders, effective leaders were rated as below the midpoint of femininity. Implications for leadership across domains are discussed.

### **Human foraging behavior in a Virtual Reality task**

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Our previous research suggests that the hot hand phenomenon, a tendency to perceive illusory streaks of clumps in sequences and grids, is a human universal tied to humans' evolutionary history of foraging. In past experiments, we showed that the hot hand phenomenon helps to explain the difficulty people have in reasoning about randomness in situations like gambling and games of hide and seek. In this new study, we examine the behavior and decision strategies made by humans in actual simulated foraging scenarios. By letting participants search for food resources in a Virtual Reality environment, we will gain insight into how people decide where to search and when they give up searching at a local site. Recorded time and movement data will capture search patterns in specific statistical distributions as well as what changes in search strategies occur when participants respond to the presence and absence of resources. Baseline cognitive tasks such as the Vandenberg Mental Rotation Task and the Money Road Map Test will be administered to account for variation in cognitive ability.

### **Teachers' assessments from children's faces at zero acquaintance are in line with third-party rated cuteness and prettiness**

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Pioneering studies in the 1970s and some recent ones suggest that a child's facial appearance could influence school grades and teacher expectations. Not only is overall agreement on human facial beauty high, but also there is consistent evidence for overgeneralizations in impression formation ("what is beautiful is good"), which might be interpreted as a result of evolutionary preferences for health indicators. In the current study, we quantified the association between grade impression, beauty, and facial shape. Forty standardized frontal facial portraits of British children (7 to 12 years) were presented in random order to Austrian teachers and student teachers. One set of raters (n= 97) assigned a Biology grade, another set (n= 111) gave their impression on

cuteness and prettiness. In addition, geometric morphometrics was used to quantify shape patterns associated with the appearance ratings. Those, with the better median grade, were rated higher on prettiness ( $t= 4.55$ ,  $p < 0.001$ ) and cuteness ( $t= 6.97$ ,  $p < 0.001$ ). Prettiness was uncorrelated with age and associated with relatively higher eyebrows, larger eyes, a larger mouth and fuller lips, and a less prominent lower face (boys:  $r= 0.631$ ,  $p= 0.003$ ; girls:  $r= 0.582$ ,  $p= 0.007$ ; 10,000 permutations). Our results were in line with a "beautiful is good" stereotype and the associated shape patterns with what is known from adult faces. Future studies investigating different school subjects and actual grades might become pressing in times of increased digital media use and distance learning.

### **Being in the know: Gossip and friendship on a college campus**

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Gossip or evaluative talk about others is ubiquitous. Gossip allows important rules to be clarified and reinforced, and individuals to keep track of their social network while strengthening their bonds to the group (Fine, 1977; Foster, 2004). Gossip is especially prevalent on college campuses; it provides an ideal environment to understand how gossip affects friend groups. Participants were recruited from Men's and Women's Crew Teams at a small liberal arts college. Using social network analysis, we found that the crew members' friend group connectedness significantly correlated with their positive and negative gossip network involvements. The more one was connected among friends, the less they were involved in spreading negative gossip and/or being the target of negative gossip. The more central one was connected among friends, the more they were also involved in spreading positive gossip and/or being the target of positive gossip.

### **The Relational Mobility Before COVID-19 scale: How the infectious threat does or does not affect the psychological tendencies of people who reside there**

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The socio-ecological concept of relational mobility and a scale to measure it (Yuki et al., 2007) have been proven useful in explaining a host of differences in psychological tendencies between people in different parts of the world (e.g., Thomson et al. 2018, PNAS). However, the ongoing COVID-19 pandemic has considerably altered people's social lives. One effect should be a decline in relational mobility. However, it has not been tested whether this social-environmental change has affected people's psychological tendencies. We have devised a new version of the relational mobility scale to address this question. The scale asks participants to report their perception of relational mobility in their local social ecology before the pandemic started. We conducted an online survey with 230 Americans and 230 Japanese in October 2020 and compared the predictive validity of the new scale ("before the pandemic") and the original scale ("during the pandemic"). The results showed, first, the cultural differences

in self-esteem, which traditional cultural psychological studies had found, still existed. Second, while there was no significant difference in the level of current relational mobility, the perception of relational mobility before the COVID-19 was higher for Americans than for Japanese, replicating previous research. Finally, this difference in self-esteem was mediated by the relational mobility score before, but not during, COVID-19. These results indicate the utility of the new scale and suggest that some ecologically adaptive psychological tendencies are shaped in the long run in a given environment.

### **Ingroup- and Outgroup Trust Differentially Correlate with Cooperative and Sexual Morality**

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Ingroup- and outgroup trust denote how much one believes that 1) family, neighbors, and friends and 2) strangers, people believing in a different religion, and foreigners will treat the self with goodwill. Being high or low on ingroup- and outgroup trust poses unique adaptive problems, and we tested three hypotheses with data from WVS Wave 6 (the factor structure of ingroup- and outgroup trust appeared problematic with WVS 5). i) To protect the self from exploitation in social exchange, people higher in either trust should be more likely to moralize cooperation-related behaviors (e.g., claiming unentitled benefits is never justifiable). Indeed, ingroup- but not outgroup trust positively and significantly correlated with cooperative morality at the individual level. ii) To facilitate mating, people higher in outgroup trust should be less likely to moralize sexual behaviors (e.g., divorce is ok). Indeed, outgroup- but not ingroup trust negatively and significantly correlated with sexual morality at the individual and country levels. Further, to minimize infectious risks, people living in parasite-laden regions of the world should moralize sexual behaviors more regardless of how much they trust outgroup members. In other words, iii) the negative correlation between outgroup trust and sexual morality at the country level should be weaker as parasite stress increases. This was indeed the case with or without controlling for individualism or religiosity. These findings, to be replicated with WVS 7, suggest that 1) ingroup- and outgroup trust are functionally distinct and, corroborating prior research, 2) moralization is strategic and calibrated to serve self-interest.

### **When do we Trust Betrayers? Suggestions from Functional Views of Friendships**

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Functional views suggest that partner preferences should be target-specific: Wanting trustworthy friends more precisely means wanting friends who are trustworthy to us (but not necessarily to others). If our friends tell other people's secrets to us, we may continue to trust those friends (and think they value us more than the betrayed party). In other words, trustworthiness perceptions may be more nuanced than existing work suggests. Trustworthiness perceptions should be sensitive not only to whether a target

betrays (versus keeps) others' secret, but also to whether that target betrays others' secrets to us. Here, we explore these predicted nuances among U.S. adults ( $N = 286$ ). All participants read vignettes describing Person A, who shares (or does not share) their friend B's secret. Participants read about this in either the first-person perspective--with A sharing that secret (or not) with participants--or in the third-person perspective--with A sharing that secret (or not) with C. Results indicate that (a) A is trusted more when keeping (versus sharing) B's secret, regardless of story perspective, but also (b) people trust A more when A betrays B's trust to them than when A betrays B's trust to C. Findings suggest a nuanced social perception of trustworthiness that challenges establishing thinking about this foundational social perception. Results further suggest that trusting certain betrayers may reflect strategic understanding of social alliances.