



## Human Behavior & Evolution Society

**23<sup>rd</sup> Annual Conference – 2011**  
**June 29<sup>th</sup> – July 3<sup>rd</sup>**

**Montpellier, France**





**23<sup>rd</sup> Annual Meeting of the Human Behavior and Evolution Society  
Montpellier, France  
June 29<sup>th</sup> - July 3<sup>rd</sup>, 2011**

Welcome to HBES 2011. Your conference hosts are Charlotte Faurie and Michel Raymond. The Program Committee consists of Martin Daly, Mark Flinn, Virpi Lummaa and Ruth Mace. The webmaster is Valérie Durand.

**Acknowledgements**

The HBES 2011 Organizing Committee would like to thank the following people for all their work:

Julio Benavides, Claire Berticat, Pierre-Yves Biba-Nkouka, Jeanne Bovet, Aurore Comte, Maxime Derex, Valérie Durand, Loïc Etienne, Clément Mettling, Aïda Nitsch, Sébastien Picard, Gul Deniz Salali, Arnaud Tognetti.

We also wish to thank this year's judges:

Poster Competition: Marco del Giudice, David Lawson & Fhionna Moore

New investigator Competition: Daniel Nettle, Rebecca Sear & Masanori Takezawa

Postdoctoral Competition: Debra Judge, Ian Penton-Voak & Beverly Strassmann

**Support**

We are grateful for support from Région Languedoc Roussillon, CNRS (INEE, DR13), Institute of Evolutionary Sciences of Montpellier (ISEM), Agglomération de Montpellier, University of Montpellier II, Ministère de l'Enseignement Supérieur et de la Recherche (MESR), Ecole Doctorale Sibaghe, Ministère de l'Enseignement Supérieur et de la Recherche (MESR), Lab. of Human Evolutionary Biology, Ville de Montpellier; Centre d'Ecologie Fonctionnelle et Evolutive (CEFE) and CASDEN.

**HBES Executive Council Administrative Officers**

Pete Richerson (*President*), Randy Thornhill (*President Elect*), Williams Irons (*Publications Committee Chair*)  
Steve Gangestad (*Past-President*), Ray Hames (*Treasurer*), Rob Kurzban (*Secretary/Archivist*), Carolyn Hodges (*Student Rep*), Kate Hanson Sobraske (*Student Rep*), Debra Lieberman (*Council member*), Martie Haselton (*Council member*)

**Cover Art**

The graphic for this year's program cover and logo was designed by Valérie Durand.

**GENERAL CONFERENCE INFORMATION**

**Registration.** On Wednesday (29<sup>th</sup>), the registration desk will be at the conference venue (Corum), 14.00-20.00. On the following days, registration schedule will be: Thursday (8.00 – 20.30), Friday (8.00 – 18:00) & Saturday (8.00 – 19.00).

**Internet Access.** All registered conference participants have free access to the Corum wireless service (on your computer, check for the ENJOY xxx access, where xxx stands for an unspecified number).

**Talks.** The Keynote Address and Plenary talks will be in the room *Pasteur*. Other talks will be either in *Pasteur*, *Antigone3* or *Rondelet*. See the map in this booklet for the exact location within the Corum.

Presenters should save talks, in PC format, to flash drive or CD-Rom, and bring them for copy in the Preview Room (access from the room *Antigone*, see map for exact location) as soon as possible. Your presentation will be then allocated to the correct room at the correct day and time automatically.

**Posters.** Each presenter has been assigned a numbered space in which to hang their poster. Posters are on display during the entire conference, in the room *Antigone* (same room as for lunch and coffee breaks). A **poster-wine** session is scheduled, on Thursday (June 30<sup>th</sup>), 19.30-20.30. More than 80 different types of wine from the Languedoc-Roussillon area will be freely tasted during this Poster session. Presenters are invited to bring their own corkscrew. Posters must be removed by Sunday noon the latest.

**Open Business Meeting** will take place in the room *Antigone3* on Friday, 13.30–14.30.

**Book Display** will be in the Antigone room for the duration of the conference.

**Useful Phone Numbers**

Corum Registration: +33 (0)4 67 61 66 98

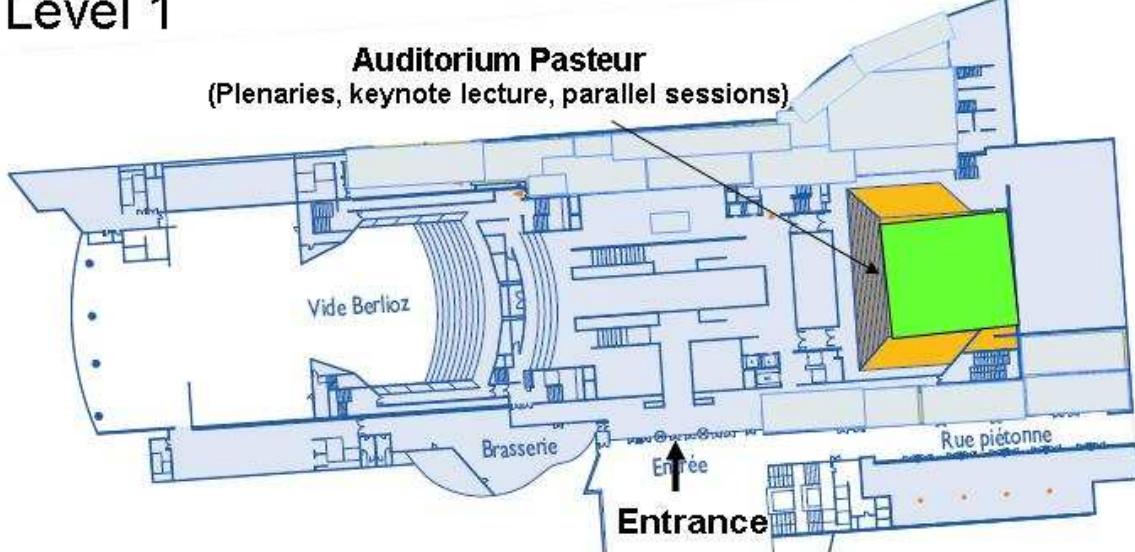
Corum Parking (attendees may get a low rate fee for their car: 15€ for 2 days, 20€ for 3 days, 24€ for 4 days and 28€ for 5 days): phone +33 (0)4 67 79 04 59

Emergency: Police (17) firemen (18), SAMU=health service (15), any emergency (112).

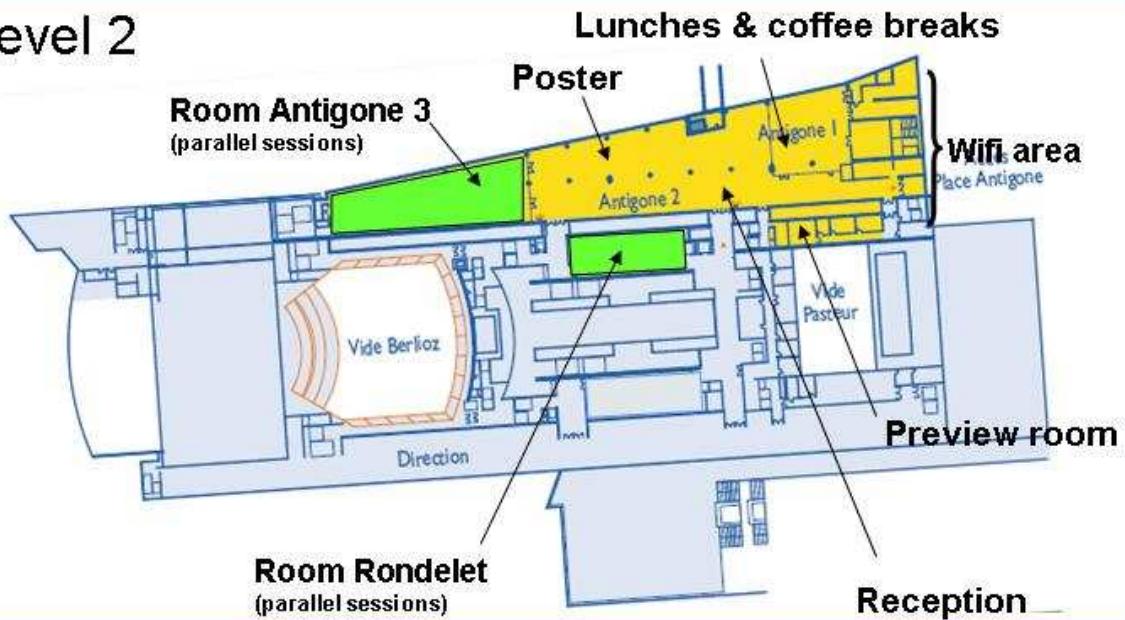
To call abroad, dial 00 (international) then the country code, and then the usual number.

## Map of the conference center (Corum)

### Level 1



### Level 2



Level 3 Exit towards « Esplanade » and city center

# Program

## WEDNESDAY, JUNE 29<sup>th</sup>

14.00-20.00: Check-in and registration

\*\*\*\* 18.30-21.00: Welcome cocktail \*\*\*\*

## THURSDAY, JUNE 30<sup>th</sup>

8.00-20.30: Registration

9.00-9.30: Welcoming remarks

9.30-10.30: Plenary 1

**Sarah B. Hrdy:** The origin of emotionally modern humans: What it means to develop and evolve as a cooperatively breeding ape.

\*\*\*\* 10.30-11.00: Coffee break \*\*\*\*

11.00-12.00: Morning sessions 1-3<sup>1</sup>

### Session 1. Non-human primate sociality. (*Pasteur*)

**Chair:** Oskar Burger

**Marie Charpentier**

Insights on kin selection in primates.

**Irene Godoy** & S. Perry

Testing Westermarck's hypothesis in a wild primate population.

**Oskar Burger**, D. Levitis & L. Bingaman-Lackey

Assessing variation in the post-reproductive lifespan across primates.

### Session 2. Differential reproductive success. (*Rondelet*)

**Chair:** Sara M. Schaafsma

**Marina Butovskaya**, V. Burkova & A. Mabulla

2D:4D ratio and reproductive success in East African foragers: the Hadza.

**Martin Fieder** & S. Huber

Homogamy, offspring count and childlessness.

**Sara M. Schaafsma**, R. Geuze, W. Schiefenhövel & T. Groothuis.

Handedness and reproductive success in a non-industrial society.

### Session 3. Parental influence on mate choice 1. (*Antigone3*)

**Chair:** Elizabeth Pillsworth

**Menelaos Apostolou**

Sexual selection under parental choice.

**Abraham Buunk**, T. Pollet & S. Dubbs.

Parental control over mate choice to prevent marriages with out-group members in Mestizos, Mixtecs, and Blacks in Mexico.

**Elizabeth Pillsworth** & H.C. Barrett

Female choice and parent-offspring conflict in human mating: evidence from the Shuar of Ecuador.

<sup>1</sup> The name of the conference room is indicated in *italic*. The names of first authors, and speakers when different, are in **bold** characters.

12.00-13.00: Late morning sessions 4-6

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**Session 4. Chimpanzee behavior. (*Rondelet*)**

**Chair:** Edwin van Leeuwen

**Anke F. Bullinger**, A.P. Melis & M. Tomasello

Chimpanzees (*Pan troglodytes*) prefer individual over cooperative strategies toward goals.

**Renato Bender** & N. Bender

The “Saci last common ancestor hypothesis” and a first description of swimming ability in common chimpanzees (*Pan troglodytes*).

**Edwin van Leeuwen**, K. Cronin, D. Haun & M. Bodamer

A new look at an old ‘custom’: understanding the sources of variation in grooming hand-clasp behavior of chimpanzees.

**Session 5. Woman's life history. (*Pasteur*)**

**Chair:** C. Athena Aktipis

**Beverly Strassmann** & W. Garrard.

Alternatives to the Grandmother Hypothesis: a meta-analysis of the association between grandparental and grandoffspring survival.

**Mary K. Shenk** & M.C. Towner

Why does fertility decline? Comparing evolutionary models of the demographic transition.

**C. Athena Aktipis**, R.A. Hiatt & B.J. Ellis

Breast cancer risk from an evolutionary life history perspective.

**Session 6. Parental influence on mate choice 2. (*Antigone3*)**

**Chair:** Brendan Zietsch

**Hanna Aronsson**

Parental influence on sexual preferences.

**Shelli Dubbs**, A. Buunk & J. Li .

Parental monitoring, sensitivity towards parents, and a child's mate preferences.

**Brendan Zietsch** & K. Verweij

Variation in human mate choices and preferences: Investigating heritability, parental influence, sexual imprinting, and assortative mating.

\*\*\*\* 13.00-14.30: *Lunch buffet & posters* \*\*\*\*

\*\*\*\* 13.30-14.30: **Executive Committee Meeting** (room next to Preview room) \*\*\*\*

14.30-15.30: Plenary 2

**Tim Clutton-Brock**: The evolution of society.

15.30-16.50: Early afternoon sessions 7-9

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**Session 7. Evolution of human society. (*Antigone3*)**

**Chair:** Micael Ehn

**Tamas David-Barrett** & R. Dunbar

The evolution of a human propensity towards social stratification, and the rise of cultural institutions as constraints.

**Joey T. Cheng**, J.L. Tracy, T. Foulsham, A. Kingston & J. Henrich

Dual paths to power: evidence that dominance and prestige are distinct yet viable avenues to social status.

**Pavel Duda** & J. Zrzavý

Evolution of human socio-cultural traits: a phylogenetic (supertree) approach.

**Micael Ehn & M. Enquist**  
Specialization leads to feedback cycles in cultural evolution.

**Session 8. Marital dissatisfaction. (Rondelet)**

**Chair:** Maryanne Fisher  
**Glenn E. Weisfeld**, L.M. Dillon, N.T. Nowak, J. Ranson, C.C. Weisfeld, E.O. Imamoglu, M. Butovskaya & J. Shen  
Conflict in marriage: universal findings and variations in five cultures.  
**Nivia Lopes**, W.T. Hattori, F. Lopes, N. Boccardi, V. Sampaio & M.E. Yamamoto  
“It’s not you, It’s me”: biological and social influences on marital dissolution.  
**Gert Stulp**, A. Buunk & Simon Verhulst  
Mutual mate choice results in couples where preferences of neither sex are optimally satisfied.  
**Maryanne Fisher**, J. Garcia & A. Merriwether  
Who’s to blame? Attribution of blame in infidelity.

**Session 9. Kinship. (Pasteur)**

**Chair:** Lisa M. DeBruine  
**Daniel Krupp**, L.M. DeBruine, B.C. Jones & M.L. Lalumière  
Opposing effects of self- and antiself-resemblance suggest the perception of both positive and negative relatedness.  
**Lisa M. DeBruine**, B.C. Jones, C.D. Watkins, S.C. Roberts, A.C. Little, F.G. Smith & M.C. Quist.  
Domain specificity in the effects of opposite-sex siblings on attitudes to cues of kinship.  
**Maria Teresa da Silva Mota**, W.T. Hattori & A.I. Alencar.  
A preliminary view of violence towards children and adolescents in a northeastern state of Brazil.

\*\*\*\* 16.50-17.10: Coffee break \*\*\*\*

17.10-18.30: Afternoon sessions 10 – 12

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**Session 10. Coalitional psychology 1. (Pasteur)**

**Chair:** John Tooby  
**Mark Flinn & Davide Ponzi**  
Hormonal mechanisms for human coalitionary behavior.  
**Sergey Gavrilets.**  
Dynamics of alliance formation and the egalitarian revolution.  
**Oliver Curry & Michael Bang Petersen**  
Coalitional politics: a natural experiment on coalitional reasoning in a multi-party election.  
**John Tooby & L. Cosmides**  
Coalition first, beliefs second: what accounts for the content of political issues?

**Session 11. Psychological sex differences. (Rondelet)**

**Chair:** Roland Tisljar  
**Casey S. McGlasson**, J. Lorince, D.J. Crandall & P.M. Todd  
Testing an adaptive explanation for sex differences in color preferences with online photos.  
**Henry Markovits**  
Males are better than females at discovering a social rule by observing interactions.  
**Ana Maria Fernandez**  
The feeling of jealousy: physiological reactions to scenes of infidelity.  
**Roland Tisljar & T. Bereczkei**

Gender-specific predictors of mate preferences in humor.

#### **Session 12. Mate choice. (*Antigone3*)**

**Chair:** Jovana Vukovic

**Thomas Pollet & G. Stulp.**

Age differences in couples from around the globe: A test of the ‘male older norm’ covering 47 countries using a simulation approach.

**Noémie S.A. Becker, P. Touraille, A. Courtiol, A. Froment & E. Heyer**

Mate choice and stature in African Pygmies.

**Wallisen Tadashi Hattori, F. Castro, F. Lopes & M.E. Yamamoto.**

Tell me who the best in your town is: Differences and similarities in mate choice among Brazilian adolescents.

**Jovana Vukovic, B. Jones, D. Feinberg, L. DeBruine, F. Smith, L. Welling & A. Little.**

Variation in perceptions of physical dominance and trustworthiness predicts individual differences in the effect of relationship context on women’s preferences for masculine pitch in men’s voices.

18.30-19.30: Late afternoon sessions 13 – 15

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#### **Session 13. Coalitional psychology 2. (*Pasteur*)**

**Chair:** Frans Roes

**Leonardo Cosentino & Emma Otta.**

The good, the bad and the ugly: evidence of perceptual adaptive biases in coalitional detection mechanisms.

**Pat Barclay & S. Benard.**

Manipulation of perceived threats to preserve rank in cooperative groups.

**Frans Roes.**

Female inheritance of permanent group membership.

#### **Session 14. Studies of foragers. (*Antigone3*)**

**Chair:** Kathryn Demps

**Coren Apicella, E. Azevedo, N. Christakis & J. Fowler.**

Isolated hunter-gatherers do not exhibit the endowment effect bias.

**Sasala Taiban.**

Change and continuity in indigenous hunting culture: a case study of the Kochapongan Rukai in Taiwan.

**Kathryn Demps, F. Zorondo, C. Garcia & V. Reyes-Garcia.**

Honey hunting with the Jenu Kuruba: An exploration of the social and individual pressures on the transmission of local ecological knowledge.

#### **Session 15. Sexuality. (*Rondelet*)**

**Chair:** Lesley Newson

**Robert King & J. Belsky**

A typological approach to understanding functions of human female orgasm.

**Gerulf Rieger, K. Johnson & R. Savin-Williams**

Gaze patterns are a strong and objective indicator of human sexual orientation.

**Lesley Newson**

Does desire for grandchildren “evoke” anti-homosexual norms?

\*\*\*\* 19.30-20.30: Wine & posters evening \*\*\*\*

## **FRIDAY, JULY 1<sup>st</sup>**

8.00-18.00: Registration

9.00-10.00: Plenary 3

**Sam Bowles:** A cooperative species: Human reciprocity and its evolution.

10.00-11.20: Morning sessions 16-18

### **Session 16. Reciprocity. (*Antigone3*)**

**Chair:** Elsa Ermer

**Masanori Takezawa**

Memory-based indirect reciprocity: an experimental study.

**Przemyslaw Zywicynski & S. Wacewicz**

Patterns of verbal conflict-resolution behaviours in 'economic' conversational exchanges.

**Julian Lim, D. Sznycer, A. Delton, T. Robertson, L. Cosmides & J. Tooby**

The more you value me, the more I value you: welfare tradeoff ratios, emotions and reciprocity.

**Elsa Ermer**

Social decision-making about tradeoffs and reciprocity in psychopathy.

### **Session 17. Correlates of individual differences in testosterone. (*Pasteur*)**

**Chair:** Carin Perilloux

**Rebecca Sear, D.W. Lawson, A. Núñez-de la Mora, G. Cooper & S. Moore**

Does testosterone correlate with marital and parental status in a polygynous, high fertility population?

A test in Gambian men.

**Aaron Blackwell, B. Trumble, C. von Rueden, J. Stieglitz, D. Cummings, M. Emory Thompson, J.J. Snodgrass, E. Fitzgerald, M. Gurven & H. Kaplan**

Don't bring your cough to the gun show: Testosterone, immunocompetence, strength and dominance in an Amazonian horticultural population.

**David Puts, C.L. Apicella & R.A. Cárdenas.**

Masculine voices signal men's threat potential in forager and industrial societies.

**Carin Perilloux & D. Buss**

Testosterone and men's sexual misperception.

### **Session 18. Symposium: *Evolved visual mechanisms.* (*Rondelet*)**

**Chair:** Russell Jackson

**Russell Jackson.**

Human navigational adaptations.

**Joshua New & E. Glaser**

Arresting perception: The ability of people and animals to implicitly capture attention also prolongs their subjectively experienced duration.

**Sandra Alvarado, R. Jackson & D. Calvillo**

Evolutionary relevance facilitates visual information processing.

**Chela Willey & R. Jackson**

Environmental falling risks and evolved horizontal distance perception.

\*\*\*\* 11.20-11.40: *Coffee break* \*\*\*\*

11.40-13.00: Late morning sessions 19-21

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**Session 19. Punishment. (*Rondelet*)**

**Chair:** Kari Britt Schroeder

**Karolina Sylwester, J. Mitchell & J.J. Bryson**

When and why do people “punish” cooperators: Individual strategies and regional variation in anti-social punishment.

**Sangin Kim, J. Tooby & L. Cosmides**

Burning down the house: Punishers just want to punish.

**Anne C. Pisor & D.M.T. Fessler**

Supernatural ire and human policing: is human norm enforcement more salient than supernatural?

**Kari Britt Schroeder**

Sensitivity to punishment and normative behavior.

**Session 20. Life history and reproductive scheduling. (*Pasteur*)**

**Chair:** Paula Sheppard

**Venla Berg & M. Jokela**

Maternal emotional support in childhood predicts timing of first birth: Testing the evolutionary-developmental theory of attachment.

**Ilona Nenko & G. Jasieńska**

First birth interval, an indicator of energetic status, is a predictor of reproductive strategy.

**Ian Rickard**

Insulin-like Growth Factor-I level at middle age covaries with life-history traits in contemporary British men and women.

**Paula Sheppard & R. Sear.**

Sex differences in life history responses: are boys less susceptible to early life social conditions than girls?

**Session 21. Willingness to care for children. (*Antigone3*)**

**Chair:** Donald Cox

**Debra Judge.**

Child fosterage in rural Timor-Leste: pushes and pulls in child movement among households.

**Catiane Souza & M.E. Yamamoto**

Do we prefer to take care of cute children?

**Monique Leitão, R. Castelo-Branco, C. Dantas, F. Lopes & M.E. Yamamoto**

Everybody loves babies: the effect of baby schema on children and adults.

**Donald Cox**

Who does the baby look like? Relationship quality, perceived resemblance and paternal solicitude.

\*\*\*\* 13.00-14.30: *Lunch buffet & posters* \*\*\*\*

\*\*\*\* 13.30-14.30: ***Open Business Meeting (Antigone3)*** \*\*\*\*

14.30-15.30: Early afternoon sessions 22-24

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**Session 22. Why get moralistic? (Rondelet)**

**Chair:** Florian van Leeuwen

**Leda Cosmides & J. Tooby**

What can responses to attempted crimes tell us about human moral psychology?

**Michael Bang Petersen**

Moralization as a strategy of last resort: Lack of social support predicts moralization of private goods.

**Florian van Leeuwen & J.H. Park**

Social categorization on the basis of moral character.

**Session 23. Facial symmetry. (Antigone3)**

**Chair:** Larissa Vingilis-Jaremko

**David Lawson, N. Pound, I. Penton-Voak, A. Toma & S. Richmond.**

Childhood health and facial symmetry in contemporary British teenagers.

**Christopher Watkins, B. Jones, A. Little, L. DeBruine & D. Feinberg.**

Cues to the sex ratio of the local population influence women's preferences for facial symmetry.

**Larissa Vingilis-Jaremko, D. Maurer & D. Shen**

The attractiveness of facial symmetry: a comparison of adults and 9-year-olds.

**Session 24. Siblings. (Pasteur)**

**Chair:** Sigal Tifferet

**Aïda Nitsch & V. Lummaa.**

Are elder siblings helpers or competitors?

**Lucie Clech & Mhairi Gibson**

Social network strategies of later borne offspring: a reaction to resource biases among siblings?

**Sigal Tifferet, H. Efrati & A. Bar**

Predicting sibling investment by perceived sibling resemblance.

15.30-16.50: Afternoon sessions 25-27

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**Session 25. Cooperation. (Antigone3)**

**Chair:** Carolyn DeClerck

**Teofilo Reyes & J. Mateo**

The evolution of allocooperation: Can nepotistic affiliative behavior act as a proximate mechanism for cooperation towards unfamiliar conspecifics?

**Daniel Nettle & A. Colleony**

Variation in cooperative behaviour across two neighbourhoods of the same city.

**Shakti Lamba & Ruth Mace.**

Variation in cooperation across human populations: evidence from the ultimatum game.

**Carolyn DeClerck, C. Boone & G. Emonds**

Cognitive demands may impose evolutionary constraints on cooperation in social dilemmas. An fMRI study.

## **Session 26. Information in the face. (Pasteur)**

**Chair:** Brian R. Spisak

**Isabel Scott**, A. Clark, L. Boothroyd & I. Penton-Voak

Is facial masculinity a sexual signal of immunocompetence?

**Austen Krill, Kristen Rae Wyre**, K. Wathne, T.M. Lake, W. McKibbin, T.K. Shackelford & S.M. Platek

Detection of aggression and sexual aggression by facial characteristics.

**Achim Schützwohl**

Detecting men's and women's proneness to infidelity from facial cues.

**Brian R. Spisak**, A.C. Homan, A. Grabo & M. van Vugt

Leadership is in the eye of the follower: testing a biosocial contingency model of leadership in intergroup relations using masculine and feminine faces.

## **Session 27. Cultural phenomena. (Rondelet)**

**Chair:** Fredrik Jansson

**John O. Beahrs**

An infrastructure for human culture.

**Thomas Currie**

The evolution of ethnic diversity.

**Jorge Yamamoto**

A multilevel well-being model from non-Western traditional cultures: fitness, happiness and adaptation.

**Fredrik Jansson**, P. Strimling & M. Parkvall.

The outcome of merging cultures.

\*\*\*\* 16.50-17.10: Coffee break \*\*\*\*

17.10-18.30: Late afternoon sessions 28-30

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## **Session 28. Symposium: Evolutionary medicine: challenges and future directions 1. (Pasteur)**

**Chair:** Nicole Bender.

**Grazyna Jasienska**

Reproductive ecology and female health, and lifespan: energy budgets, physiological trade-offs and antagonistic pleiotropy.

**Elodie Vercken & B. Mauroy**

Don't fall off the adaptation cliff! Asymmetrical fitness costs constrain the evolution of human lung.

**Kaspar Staub**, U. Woitek, M. Henneberg & F. Rühli

Challenging perspectives in evolutionary medicine: microevolution of human morphology and its medico-social impact.

**Gillian Ragsdale & R. Foley**

Parent-of-origin effects on empathy.

## **Session 29. Responses to cheaters. (Antigone3)**

**Chair:** Gregory Waymire.

**Toko Kiyonari**, M. Furukawa & T. Hasegawa.

Defectors can pretend to be nice but their Machiavellian nature are revealing.

**Kumiko Mori**

Cheater detection in young adults with and without autistic spectrum disorders: a study using Wason selection tasks.

**John Dickhaut**, R. Lunawat, B. Xin & **Gregory Waymire**

Language sustains trust and cooperation even when uncertainty enables widespread cheating on social contracts.

**Daniel Bello & C. Obadia**

Cheater detection in marketing channels.

### **Session 30. Evolutionary psychology. (Rondelet)**

**Chair:** Ben Brilot.

**Willem Frankenhus & K. Panchanathan**

Individual differences in developmental plasticity may result from stochastic sampling.

**Brice Gouvernet**, S. Combaluzier, J.-L. Viaux & M. Bussoletti

Binge drinking, evolutionary psychology and handicap theory.

**Guillaume Dezecache**, L. Conty, M. Chadwick, L. Philip, D. Sperber & J. Grèzes.

“That she makes you happy makes me happy”: evidence for transitive emotional transmission in humans through facial signaling.

**Ben Brilot**, D. Nettle, J. Read & M. Bateson.

Predicting general vs specific anxiety: a model of the adaptive generalisation of defensive behaviour.

18.30-19.30: Late afternoon sessions 31 - 33

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### **Session 31. Symposium: Evolutionary medicine: challenges and future directions 2. (Pasteur)**

**Chair:** Nicole Bender.

**Elizabeth Uhl**

Expanding the perspective: animal diseases and evolutionary medicine.

**Rudi G.J. Westendorp**

Selection for human longevity.

**David van Bodegom**, M. Rozing & R. Westendorp

Socioeconomic status determines sex dependent survival of human offspring.

### **Session 32. Risky decisions. (Antigone3)**

**Chair:** Caroline Ugglå.

**Sandeep Mishra & M. Lalumière**

Mind the gap: Evidence that inequality causes risk-taking.

**Caroline Ugglå & R. Mace**

Sexual risk-taking in the face of HIV - A life history perspective.

### **Session 33. Disgust. (Rondelet)**

**Chair:** Mícheál de Barra.

**Dieneke Hubbeling**

Different forms of disgust.

**Joshua Tybur**, D.V. Becker & V. Griskevicius

Mapping disgust in the moral domain.

**Mícheál de Barra & V. Curtis**

Does disgust predict fewer infections? A study of health and the behavioral immune system in rural Bangladesh.

20.00-21.00: Keynote

**Randolph Nesse**: Maladaptation and natural selection.

## SATURDAY, JULY 2<sup>nd</sup>

8.00-19.00: Registration

9.00-10.00: Plenary 4

**Andy Whiten:** The evolution and ontogeny of conformity, overimitation and culture.

10.00-11.20: Morning sessions 34-36

### Session 34. Cultural transmission. (*Rondelet*)

**Chair:** Luke McCrohon

**Alex Mesoudi**

Variable cultural acquisition costs constrain cumulative cultural evolution.

**Julie Coults & K. Eriksson.**

The advantage of several cultural parents in cultural transmission.

**Helen Wasielewski**

Ratcheting up the transmission chain with a functional task: identifying the social learning mechanisms of cumulative cultural evolution.

**Luke McCrohon**

Implications of a two-stage model of cultural transmission on the potential life history strategies of cultural replicators.

### Session 35. Facial attractiveness 1. (*Antigone3*)

**Chair:** Carmen E. Lefèvre

**Ferenc Kocsor, T. Bereczkei & A. Feldmann**

Females recruit more brain areas than males while viewing attractive opposite-sex faces.

**Amanda Hahn, R. Sprengelmeyer & D. Perrett**

The incentive salience of facial beauty: impact of face type and own perceived attractiveness.

**Carmen E. Lefèvre, R. Whitehead, D.W. Hunter, D. Xiao, B.P. Tiddeman & D.I. Perrett**

Reading the face: cues of sex and health quality from skin texture.

### Session 36. Cognitive development. (*Pasteur*)

**Chair:** Laura Cristina Stobäus

**Olivier Morin**

How strong a motivation is imitation?

**Cristina Moya**

Verbal cues of language use promote inductive inference in children.

**James Riviere**

Manual search behavior for objects moving out of sight in young children and non-human primates.

**Laura Cristina Stobäus, M.L. Seidl-De-Moura & V.S.R. Bussab.**

Cooperation development in childhood: possible effects of maternal postpartum depression.

\*\*\*\* 11.20-11.40: *Coffee break* \*\*\*\*

11.40-13.00: Late morning sessions 37-39

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**Session 37. Cooperation, conformity and coordination. (Pasteur)**

**Chair:** Paul Seabright

**Tiago Soares Bortolini**, K. Vieira Dantas, N. Lima Soares, R.D. de Souza jr, T. Pinto Soares, W.T. Hattori & M.E. Yamamoto

The good samaritan probably is good for his own group - cooperation and religiosity among Brazilian undergraduates.

**Rochele Castelo-Branco**, M. Leitão, C. Dantas, **Fívia Lopes** & M.E. Yamamoto

Religion or generosity: what matters when you cooperate with someone?

**Anuska Irene Alencar**, N.B. Dutra, J.F.B.C. Farias & M.E. Yamamoto.

Criticizing those who do not cooperate encourages children's donations in a public goods game.

**Samuele Centorrino**, E. Djemai, A. Hopfensitz, M. Milinski & **Paul Seabright**

Smiling is a costly signal of cooperation opportunities: experimental evidence from a trust game.

**Session 38. Facial attractiveness 2: Effects of face colouration. (Antigone3)**

**Chair:** Frederick T. Wehrle

**Ian Stephen**, I. Scott, V. Coetzee, N. Pound, D. Perrett & I. Penton-Voak

Cross-cultural effects of colour, but not morphological masculinity, on perceived attractiveness of men's faces.

**Bernhard Fink**, P.J. Matts, D. d'Emiliano, L. Bunse, B. Weege & S. Roeder.

Colour homogeneity and visual perception of age, health and attractiveness of male facial skin.

**David Perrett**, D. Re, R. Whitehead, I. Stephen, V. Coetzee, C. Lefèvre, F. Moore, D. Xiao & G. Ozakinci

Face colour, health, lifestyle and attractiveness.

**Frederick T. Wehrle**, B. Fink & H.M. Schaefer

The love for red – how receiver biases may influence human attraction to skin colouration.

**Session 39. Symposium: Mating Strategies in Two Cultures: Brazil and Norway. (Rondelet)**

**Chair:** M.E. Yamamoto.

**Maria Emilia Yamamoto**, C. Sbruzzi & F. Castro

Remarriage in a low income community in Northeast Brazil: Women's profile and value in the marriage market.

**Trond Viggo Grøntvedt** & L.E.O. Kennair.

Mate value, current partner and ideal partners in a gender egalitarian society.

**Felipe Castro**, W.T. Hattori, M.E. Yamamoto & F. Lopes

Long-term romantic preferences in a Brazilian sample: are they satisfied in real relationships?

**Mons Bendixen & Leif Edward Ottesen Kennair**

Judgment of the effectiveness of competitor derogation and strategic self-promotion in world's most egalitarian culture.

\*\*\*\* 13.00-14.30: Lunch buffet & posters \*\*\*\*

14.30-15.30: Plenary 5

**Jean-Marie Hombert**: Evolution of *Homo sapiens*: genes, fossils and languages.

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15.30-16.50: Early afternoon sessions 40-42

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**Session 40. Language origins. (*Rondelet*)**

**Chair:** Jean-Louis Dessalles

**Thom Scott-Phillips**

A general framework for the emergence of communication, and why humans are different.

**Helene Cochet & J. Vauclair**

Hand preference for gestural communication and the question of language origins.

**Natalie Uomini**

The prehistory of right-handedness: archaeology and ethology.

**Jean-Louis Dessalles**

Human language may be an ESS after all.

**Session 41. Ovarian cycle stage effects. (*Pasteur*)**

**Chair:** Karl Grammer

**Christina M. Larson, M. Haselton, K. Gildersleeve & E. Pillsworth**

Changes in women's feelings about their romantic relationships across the ovulation cycle: causes and consequences.

**Anna Ziomkiewicz, S. Wichary & D. Bochenek**

Temperament and ovarian steroid levels in reproductive age women.

**Kelly D. Cobey, T.V. Pollet, S.C. Roberts, C. Klipping, N. Appels, Y. Zimmerman, H.J.T. Coelingh Bennink & A.P. Buunk**

Reported jealousy differs as a function of menstrual cycle stage and contraceptive pill use: A within-subjects investigation.

**Karl Grammer, E. Oberzaucher & B. Haslinger.**

Cognition and hormones in females: associative networks and knowledge organisation.

**Session 42. Size matters. (*Antigone3*)**

**Chair:** Martin Tovee

**Priscille Touraille**

Stature sexual dimorphism in *Homo sapiens*: a costly evolution due to gender hierarchy?

**Daniel E. Re, D.W. Hunter, V. Coetzee, B.P. Tiddeman, D.K. Xiao, L.M. DeBruine, B.C. Jones & D.I. Perrett.**

Facial cues to height influence perceived leadership ability.

**Gregory Webster**

Big and bad: the height-aggression link in men.

**Martin Tovee & K. Crossley**

Male and female observers' ideal body size and shape preferences for their own body and their partner's body measured using an interactive body morphing technique.

\*\*\*\* 16.50-17.10: Coffee break \*\*\*\*

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## 17.10-18.30: Afternoon sessions 43-45

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### **Session 43. Language. (Rondelet)**

**Chair:** Fiona Jordan

**Greg Bryant.**

Signals and cues in interdisciplinary communication science.

**Kyle Thomas**, W. Mendes, S. Pinker & C. Nocera.

Do you want to see my etchings? Evidence for a game-theoretic model of indirect speech.

**Tanya Broesch** & G. Bryant.

Universals in infant-directed speech: Evidence from Fiji, Kenya, and US.

**Fiona Jordan**, M. Dunn, S. Beller & A. Bender.

Counting coconuts for the chief: coevolution in language and culture.

### **Session 44. Facial attractiveness 3. (Antigone3)**

**Chair:** Petra Gyuris

**Urszula Marcinkowska**, R. Burris, M. Fox, & **Minna Lyons**.

Women fixate longer on feminine than masculine men's faces when judging for a long-term, but not a short-term, relationship.

**Antonio S. Silva**, V. Lummaa, U. Müller, A. Mazur, M. Raymond & A. Alvergne.

Do attractive people have more children? A cross-cultural study on facial attractiveness and reproductive success.

**Lynda G. Boothroyd**, J. Vukovic, R. Page, E. Meins, D.M. Burt & B.C. Jones

Circum-pubertal effects of children's and adolescents' judgments of facial attractiveness.

**Petra Gyuris**, F. Kocsor & T. Bereczkei

Face preference in childhood and mate choice in adulthood.

### **Session 45. Relationship damage and repair. (Pasteur)**

**Chair:** Daniel Sznycer

**Eric Schniter**, R. Sheremeta & D. Sznycer

Rebuilding damaged trust with apology, promises, and atonement.

**Jodie L. Burchell** & R. Wilkinson

Better together: the role of hurt feelings in maintaining relational closeness.

**Theresa Robertson**, A. Delton, D. Sznycer, J. Lim, J. Tooby & L. Cosmides

Social exclusion as a cue to social value.

**Daniel Sznycer**, J. Tooby & L. Cosmides

The grammar of disgrace: The psychology of shame is domain-specific and closely tracks the psychology of social valuation.

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## 18.30-19.30: Late afternoon sessions 46-48

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### **Session 46. Effects of pathogen pressure. (Antigone3)**

**Chair:** Randy Thornhill

**Mark Schaller**, A. Beall & D. Murray

Pathogen threat and its implications for mate preferences.

**Takeshi Hamamura** & J. Park

A cross-cultural analysis of defensive reactions to the "swine flu" outbreak from the perspective of pathogen prevalence.

**Randy Thornhill** & Corey Fincher

Parasite stress promotes homicide and child maltreatment.

### **Session 47. Female competition and aggression. (*Pasteur*)**

**Chair:** Ruth Mace

**Jessica Yaeger, Sara Margolius & Joyce F. Benenson**

Explaining the disconnection between anger and aggression in women.

**Elise Huchard & G. Cowlishaw**

Female-female aggression around mating: an extra cost of sociality in a multimale primate society.

**Ruth Mace & A. Alvergne**

Female female competition in rural Gambian households.

### **Session 48. Enforcement of cooperation? (*Rondelet*)**

**Chair:** Max Krasnow

**Nobuyuki Takahashi, M. Inaba & H. Nakagawa.**

Comparison of four types of sanctioning mechanism.

**Andrew Delton, J. Nemirow, T. Robertson, A. Cimino & L. Cosmides**

Obligated to contribute? The effects of excludability on obligations in collective action.

**Max Krasnow, A. Delton, J. Tooby & L. Cosmides**

What second-order free rider problem?

\*\*\*\* 20.30: Banquet \*\*\*\*

## SUNDAY, JULY 3<sup>rd</sup>

9.00-10.00: Plenary 6

**Frank Marlowe:** Adaptively relevant environments.

10.00-11.20: Morning sessions 49-51

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### Session 49. Adaptation or byproduct? (*Antigone3*)

**Chair:** Andrew Lewis

**Guy Taylor-Covill & Frank Eves**

Does what we need influence what we see? Implicit energy demands affect our perception of a locomotor challenge

**Mark van Vugt & V. Griskevicius**

Human-Nature: the evolutionary psychology of environmental sustainability.

**Diane Ormsby, J. Haywood, P. Lester & B. Dixson.**

Does ambient temperature predict fluctuations in birth sex ratio in New Zealand?

**Andrew Lewis & M. Galbally.**

An evolutionary mismatch in infant development: the contradiction between Western practices of breast feeding and infant sleep patterns.

### Session 50. Polygamy and monogamy. (*Pasteur*)

**Chair:** Andrew T. Hendrickson

**Daniel Kruger, J. Clark & S. Vanas**

The operational sex ratio influences birth outcomes in modern human populations.

**Kathrine Starkweather & R. Hames**

A survey of non-classical polyandry.

**Elisabeth Oberzaucher & Karl Grammer**

The case of Moulay Ismael the Bloodthirsty: fact or fancy?

**Andrew T. Hendrickson, J.D. Fortenberry & P.M. Todd**

Predicting cases of multiple sexual partners with simple mate choice strategies.

### Session 51. Prosocial behaviour. (*Rondelet*)

**Chair:** Slimane Dridi

**Peter Descioli & S. Krishna.**

Giving to whom? Altruism in different types of relationships.

**Jean-Baptiste André & N. Baumard**

Equilibrium selection and human cooperation: the evolution of fairness.

**Francis T. McAndrew & C. Perilloux.**

The gender and personality dynamics of self-sacrificial “heroic” behavior in mixed-sex groups.

**Slimane Dridi & L. Lehmann.**

Evolution of learning rules in social interactions.

\*\*\*\* 11.20-11.40: Coffee break + **Competitions awards announcement** \*\*\*\*

11.40-13.00: Late morning sessions 52-54

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### **Session 52. Evolutionary Cognitive Psychology. (*Antigone3*)**

**Chair:** James Broesch

**Gary L. Brase.**

Not all pictures are worth a thousand words: Differential effectiveness of visual aids in statistical reasoning.

**Stephen Le.**

Evolutionary time discounting.

**Josh Ackerman**, J. Shapiro, V. Becker, S. Neuberg & D. Kenrick.

Effects of emotional expression on memory for the unemotional.

**James Broesch** & J. Henrich.

Taboo as a system of inferences: simple heuristics allow for accurate identification of hazardous novel fish species in Fiji.

### **Session 53. Symposium: Parenting, Mating, and Life History Strategy (*Rondelet*)**

**Chair:** A.J. Figueiredo

**Aurelio José Figueiredo**, T. de Baca, M. Sotomayor-Peterson & V. Smith-Castro.

Shared parenting, combined parental effort, and life history strategy: a cross-cultural comparison.

**Catherine Salmon**, I.A. Kauffman, A.M. Cuthbertson, P.R. Gladden & A.J. Figueiredo.

Life history strategy, parental pressure, peer pressure, and differential vulnerability to disordered eating behaviors

### **Session 54. Individual differences. (*Pasteur*)**

**Chair:** Steven Gangestad

**Marco Del Giudice**, B. Ellis & E. Shirtcliff.

The Adaptive Calibration Model: An evolutionary-developmental framework for stress responsivity.

**Mark Adams**, L. Penke & A. Weiss

Natural selection on personality has a genetic basis.

**Drew Bailey**, D. Geary, R. Walker, G. Blomquist & K. Hill

Personality and reproductive success in the Aché (Paraguay): implications for the evolution of human individual differences.

**Steven Gangestad**, R. Yeo & J. Liu

Rare deletions predict general cognitive ability, brain neurometabolite concentrations, and schizophrenic phenotype.

## POSTERS

### Group 1. Cognition.

#### **Gary L. Brase**

Errors in memory of conditional rules: new evidence of domain-specific reasoning processes.

**Laura Dane**, L. Goh, C. Clapperton & B. Fink

The truth is in the adaptations of the observer: attributions of deception depend on reproductive costs and attractiveness.

#### **Alexis de Tiège** & Johan Braeckman

Why did self-awareness originate and evolve?

**Frank Eves** & Guy Taylor-Covill

Slope perception: once survival positive, now survival negative?

**Glenn Geher**, B. Crosier, H. Dillon & R. Chang

Evolutionary psychology's place in evolutionary studies: a tale of promise and challenge.

**Brice Gouvernet**, S. Combaluzier & J.-L. Viaux

Towards an evolutionary and integrative approach of the relationships between defense mechanisms and coping strategies.

#### **Bjørn Grinde**

Happiness conceived as the net activity of rewarding and punishing brain modules.

**Kathrin Masuch**, R. Schatz, S. Egger, I. Holzleitner, E. Oberzaucher & K. Grammer.

The duration effect in rating studies – quantity instead of quality?

**Mary Maxwell** & Shiva Motlagh

Man without mind.

#### **Matteo Meschiari**

How landscape invented mind. An evolutionary theory.

**Virginia A. Periss**, Carlos Hernandez-Blasi & D.F. Bjorklund

The development of the “cognitive-babyhood” effect in adolescence.

**Elisabeth Rolland-Thiers**, A. Milhau, L. Heurley & M. Launay

Temporal evolution of an implicit learning: a case of visual-spatial priming.

**Pia Stephan**, E.h Oberzaucher & K. Grammer

Sex differences in urban home ranges and the accuracy of cognitive maps.

**Michele K. Surbey** & Jessica a. Chewe

Predictors of the manipulative Machiavellian mind.

**Wataru Toyokawa**, T. Kameda & H.-R. Kim

Can humans show “swarm intelligence” under uncertainty as do honey bees?

**Emmanuel Viglieno**, L. Munilla, W. Briki & M. Jimenez.

Evolution of perception in a categorization task: the dynamics of phase transition

**Juliane Wilcke**

Evaluation of research strategies used in evolutionary studies of consciousness.

**Michael Woodley**

Towards a fully evolutionarily and ecologically informed model of human intelligence.

**Kunihiro Yokota** & D. Nakanishi

Normative conformity as coalition formation to cope with threat of disease infection.

## **Group 2. Cooperation and reciprocity.**

**Béla Birkás**, B. Lábadi & T. Bereczkei

Trustworthiness of a face depends on gaze direction.

**Pierre Courtois**, T. Tazdaït & R. Nesah

How to play the games? Nash versus Berge behavior rules.

**Tamas David-Barrett** & R. Dunbar

*Homo bellicus*: a war hypothesis

**Milena Dzhelyova**, T. Backfield, I. Jentzsch & D. Perrett

Gaze direction and cooperativeness.

**Karl Frost**

Does ritual support in-group cooperation?

**Ayaka Hatano**, Y. Horita & T. Yamagishi

The effect of consensus on punitive behavior.

**Kathleen Heath**, J. McCullough, K. Norton & A. Ballinger

Within-group elimination strengthens in-group conformity in times of resource competition: a case of the Salem witch-hunts.

**John Hinshaw**

Local union leadership: prize to be won or price to be paid?

**Kai Hiraishi**, C. Shikishima, Y. Takahashi, S. Yamagata, Y. Sugimoto & J. Ando

Heritability of decisions and outcomes on Public Goods Games.

**Misato Inaba** & N. Takahashi

Comparison of the effects of exchange form on social solidarity.

**Junhong Kim**

Cultural evolutionary process of human cooperation.

**Kristen Knowles** & J.E. Lycett

Perceptions of cooperation and trust in the human voice.

**Florian Lange**, M. Luckhof & F. Eggert

Please, go ahead! – Generating field evidence for indirect reciprocity.

**Stephen Le**

Societal trust, geographical latitude, and evolution.

**Rie Mashima** & N. Takahashi

How do people evaluate different types of sanctioners?

**Daisuke Nakanishi** & K. Yokota

The effect of intergroup conflict on ingroup cooperation and conformity – simulation and experimental data.

**Yohsuke Ohtsubo** & E. Watanabe

Self-punishers have a bad reputation.

**Linda Olah-Szijjarto** & T. Bereczkei

Who trusts, who reciprocates, and who retaliates?

**Ryoichi Onoda** & N. Takahashi

The emergence of in-group favoring behavior in indirect reciprocity setting.

**Phellipe Siqueira** & **Fivia Lopes**

What to look for in a friend?

**Adam Sparks**

How do subtle cues of social presence influence cooperation?

**Kyle Thomas**, P. DeScioli & S. Pinker

Common knowledge and coordination.

### **Group 3. Cultural evolution.**

#### **Thomas Abel**

Cultural evolution in a nested hierarchy of ‘information cycles’: the case of conversation.

#### **Elliot Aguilar & S. Ghirlanda**

Toward a cultural coalescent.

#### **Nigel Baradale**

Social incentives and human evolution.

#### **John O. Beahrs**

“Useful information” in human evolution.

#### **Chun-Chieh Chi**

The adaptive capacity of indigenous Taroko people’s biocultural tradition in eastern Taiwan.

#### **Maxime Derex**

Information scroungers, tool exchange and knowledge exchange: experimental simulations of cultural transmission

#### **Ida Envall, S. Isaksson, P. Lindenfors & M. Wallenberg-Bondesson**

Evolution of culinary arts. An empirical study of long-term change in European cooking recipes.

#### **Yuval Laor**

What is cultural fitness?

#### **Luke McCrohon**

The generalized complexity hypothesis and diffusion between culturally coadapted systems.

#### **John McCullough, K. Heath & A. Smith**

Gene-culture co-evolution of the European Neolithic niche construction: lethal genetic consequences for modern populations.

#### **Ignasi Pasto & A. Picin**

Social use of technology and human evolution.

#### **Carsta Simon, F. Eggert & W. Baum**

Memes - the new ghosts in the machine? To what extent does the concept of meme contribute to a scientific account of cultural practices?

#### **Cory Stade**

On the intermediate stages of the evolution of language.

#### **Luc Steels**

Minimizing cognitive effort is one of the key drivers of cultural language evolution.

#### **Maria Wallenberg-Bondesson**

Penal evolution: political legitimacy theory revisited - a comparative study of legal codes from three pre-modern societies.

#### **Olaf Witkowski**

Can cultural adaptation lead to evolutionary suicide?

#### **Matthew Zimmerman**

Why the origins of human warfare is most likely cultural.

### **Group 4. Development and life history.**

#### **Triin Anton & B. Ellis**

Cluster analysis of developmental pathways of divergent reproductive strategies.

#### **Jeremy Atkinson, R.N. Pipitone, A. Sorokowska, P. Sorokowski & M. Rowe**

A clean measure of pubertal androgen exposure: wrist width predicts reproductive success, risk taking, vocal parameters, sexual behaviours and facial sexual dimorphism.

**Konika Banerjee, O. Haque & E. Spelke**

Melting lizards and crying mailboxes: children's preferential recall of minimally counterintuitive concepts.

**Abby Chipman & Ed Morrison**

Influence of kin networks and perceptions of risk on the desired age of first birth.

**Masako Fujita & Eric Roth**

Mothers with low vitamin A status breastfeed daughters more often than sons in drought-ridden northern Kenya: A test of the Trivers-Willard Model.

**Dominick Grossi & E. Pillsworth**

Changes and variation in women's mating patterns and preferences: a life history perspective.

**Jessica Hehman & Daphne Bugental**

Stigmatization of those who are "too young" or "too old": evolutionary-based explanations for "stereotype challenge" vs. "stereotype threat"?

**Jernej Hribenik, A. Lewis, P. Kremer, E. Leslie, J. Toumbourou & J. Williams**

A life history model of female pubertal timing: the role of attachment and positive family environment.

**Laura Johnsen, D. Kruger & G. Geher**

Childhood neighborhood environment as a predictor of childhood injury, life history strategy, and sexuality.

**Darcia Narvaez**

Human nature: the importance of early life experience.

**Victor Shiramizu, W.T. Hattori & F. Lopes**

When attachment leads.

**Laura Stobäus, M.L. Seidl-de-Moura, D. Ramos & T. Victor**

Discounting the future: differences among youngsters from different socio-demographic contexts in Rio de Janeiro, Brazil.

**Odette van Brummen-Girigori**

Does father absence place daughters at risk for early sexual activities, lower academic performance and a less stable intimate relationship as adults?

#### **Group 5. Economics.**

**Stephanie M. Cantu, K. Durante, V. Griskevicius & J.A. Simpson**

Briefcase over baby: the influence of sex ratio on career aspirations.

**Andrew Clark & Isabel Scott**

Economic ideologies - lessons from Darwin.

**Michael Frederick & S. Cocuzzo**

Why work when you could freeload? Contrafreeloading in quinpirole-treated rats is not due to force-of-habit.

**A. Ellis White, Y.J. Li & D.T. Kenrick**

Dream jobs: How fundamental goals influence our employment preferences.

#### **Group 6. Emotions.**

**Heitor Fernandes, J. Natividade & C. Hutz**

Sex differences in jealousy: testing the evolutionary hypotheses with a Brazilian validated scale.

**Katherine Hanson Sobraske, J. Boster & S. Gaulin**

Surveying the jealousy landscape.

**Viktoria Mileva & A. Little**

Human facial expressions are modulated by manipulated facial dominance.

**Audrey Milhau, T. Brouillet, L. Heurley, E. Rolland-Thiers & D. Brouillet**

When emotion creates action: emotion as an adaptive mechanism.

**Jean Carlos Natividade, Heitor Fernandes & C. Hutz**

Why are women more jealous, and why do men like it? Sex differences in jealousy with a Brazilian sample.

**Renata Pereira deFelipe, L. Cosentino & V. Bussab**

Paternal support role in the emergence of postpartum depression in a brazilian sample.

**Pia Reindl, K. Grammer & E. Oberzaucher.**

Simulating appraisal processes of emotional events.

#### **Group 7. Human biology.**

**Louis C. Alvarado, A. Galbarczyk, M. Walas & G. Jasieńska**

Testosterone, musculature, and strength across the life course of men from rural Poland.

**Delphine de Smet & L. van Speybroeck**

Reinvestigating the Westermarck effect on brother-sister incest aversion: taking the physiological-experimental turn.

**Laurent P. Ferrier, L. Heurley, P. Clauzon, D. Brouillet & M. Jimenez**

Color perception is not immune to potential action and perceptual knowledge.

**Ilmari Määttänen, M. Jokela & L. Keltikangas-Järvinen**

Testosterone and temperament: moderating role of marital status.

**Melanie A. Martin, S. J. Gaulin, R. Evans, W. Lassek, M. Gurven, H. Kaplan, A. L. Morrow, J. G. Woo**

Breast is best but whose is better? Maternal milk fatty acid composition in U.S. and Amerindian mothers.

**Dillon Niederhut**

A brief survey of human uniqueness.

**Robert Oum & L. Hone**

The falling age of menarche in modern societies from an evolutionary life history perspective.

**Takumi Tsutaya, A. Shimomi, H. Mukai, T. Nagaoka, J. Sawada, K. Hirata & M. Yoneda.**

A model for estimating weaning ages in archaeological populations using nitrogen isotopes and bone turnover rates.

**Linda van Speybroeck & D. de Smet**

Why men do not make good vampires. Testing the ability of humans to detect true blood.

**Vasiliy Vasilyev, E. Sukhodolskaya, P. Kulidzhanov, V. Burkova, A. Mabulla, M. Butovskaya & A. Ryskov**  
Genomic variation of Dopamine transporter (DAT1) and Dopamine D2 receptor (DRD2) genes in two traditional East African groups: the Hadza and the Datoga.

**Szymon Wichary & A. Ziomkiewicz**

Birth weight, recent life stress and anxiety.

**Magdalena Walas, A. Galbarczyk, I. Nenko & G. Jasieńska**

Digit ratio (2D:4D) as an indicator of biological condition among men from a Polish rural population.

**Lisa Welling, D. Puts, S.C. Roberts, A. Little & R. Burriss.**

Hormonal contraceptive use and mate retention behavior in women and their male partners.

**Sonja Windhager, B. Fink, P. Mitteroecker & K. Schaefer**

Strong and handsome: Partial Least Squares analysis and deformation grids depict male facial characteristics that correspond to physical strength.

## **Group 8. Kinship.**

**David Bishop**, R. Albert, A. Gonzalez, K. Nichols & R. Ziegeweid

The role of grandparent ratings of phenotypic resemblance in discriminative grandparental investment.

**Yasuyuki Fukukawa**, K. Kawaguchi & K. Takao

The husband's mother is NOT always the devil in house: Testing the grandmother hypothesis in modern Japanese society.

**Andrzej Galbarczyk**, M. Walas, I. Nenko & G. Jasienska

Duration of breastfeeding is differentially influenced by paternal or maternal grandparents in a contemporary rural Polish population.

**Olena Lutsenko**.

The relations between "new relatives" after joining up the families: parents-in-law, daughters-in-law, sons-in-law in Ukraine.

**Gretchen Perry**, M. Daly & J. Kotler

The shift to "kin care" in child protection.

**Sangkwon Woo**, M. Flinn, M. Hamilton & R. Walker

Socioecological conditions, polygyny, and marriage arrangements in hunter-gatherer societies.

## **Group 9. Mate choice.**

**Jan Antfolk & Pekka Santtila**

Fertility increases aversion to incest and decreases sexual restrictiveness in women.

**Ani Bajrami**

Sexual selection or cultural selection: mate choice in Albanian population, Greek minorities and cultural community of Roma and Aromanian.

**Andreas Baranowski & O. Vitouch.**

The science of seduction: teaching seduction techniques and evaluating their effectiveness.

**Melissa Barkat-Defradas**

Speech tempo: an honest signal for selecting mate for reproduction?

**Julien Barthes**

Social stratification and the evolution of male homosexual preference

**Charlene Belu & L. Honey**

The women your mother warned you about: Dominance, sociosexuality and the Dark Triad.

**Jeanne Bovet**

Female attractiveness and paternity confidence

**Gayle Brewer & D. Rigby**

Female intra-sexual competition.

**Lorne Campbell & C. Wilbur**

What do women want? An interactionist account of women's mate preferences.

**Mary Louise Cowan**

Nobody's perfect. The relationship between intelligence, physical attractiveness, and funniness.

**Kara Crossley, T. Pollett & M. Tovee**

Changes in body weight predict attractiveness ratings in male and female bodies which vary in leg and torso length.

**Marilu Cruz & R. Brito**

Exploratory study on the influence of menopause and climacteric in relationship satisfaction, partner choice and types of relationship in women in Belem and Napoli.

**Morgan David & L.-A. Giraldeau**

The role of personal information in human mate-choice copying.

**Peter Etchells**, A. Clark, J. Burn & I. Penton-Voak.

Assessing dynamic predictors of human gait attractiveness.

**Ana Maria Fernandez**, M.A. Corrêa Varella, J.H. Benedetti Piccoli Ferreira, I. Bertelli Cabral dos Santos & M. Dufey

Sex-differences in the forced-choice infidelity scenarios among Chilean and Brazilian Students.

**José Henrique Ferreira**, A.M. Fernandez, M.A. Varella, K. Celis & N. Cordova

Sex-differences in Chile and Brazil: age and context refine the evolved features of mate-seeking.

**Maryanne Fisher & Sarah Shaw**

Intrasexual competitive strategy use as perceived by targets.

**Kelly Gildersleeve & D. Frederick**

Sex, age, and bargaining power within the mating market.

**Ian Holliday**, O. Longe, J. Thai, P. Hancock & M. Tovee

Central representation of female body-shape attractiveness: an fMRI study.

**Iris J. Holzleitner**, E. Oberzaucher, L.S. Pflüger & K. Grammer

Matching pairs. Perceived and anthropometric similarity in a rural sample of long-term mates.

**Nadine Hugill**, B. Fink, N. Neave, A. Besson & L. Bunse

Women's perception of men's sensation seeking propensity from their dance movements.

**Vera Kempe & F. Moore**

Do women prefer faces of athletic or of verbally fluent men?

**Anthonieta Mafra**, F. Castro, W.T. Hattori, M.E. Yamamoto & F. Lopes

How do people perceive themselves in the mate market? The influence of the context on the self-assessment.

**Melissa McDonald & C. Navarrete**

Toward a psychological theory of female-specific prejudice: Shared mechanisms for protecting reproductive choice in racial and minimal group contexts.

**Josephine Mo**, K. Cheung, L. Gledhill, T. Pollet, L. Boothroyd & M. Tovee

Cross-cultural differences in judgments of attractiveness, health and fertility in female bodies by Chinese observers in Rural China, Hong Kong and the United Kingdom.

**Fhionna Moore**, C. Cassidy & D. Perrett

Financially independent women prefer feminised male faces.

**Fhionna Moore**, M. Law Smith, V. Taylor & D. Perrett

Sexual dimorphism in the female face is a cue to health and social status.

**Ashley Peterson**, G. Geher & S.B. Kaufman

Predicting preferences for sex acts: which traits matter most, and why?

**Julia Robertson & T. Hussey**

Shorter men have more one night stands: Initial support for the importance of male contests over female mate choice in human sexual selection.

**Susanne Röder**, B. Fink, P. Matts, R. Johnson & M. Burquest

Differences in visual perception of age and attractiveness of female facial and body skin.

**Sascha Schwarz & M. Hassebrauck**

Sex and age differences in mate selection preferences.

**David Smith**, B. Jones, D. Feinberg & K. Allan.

A modulatory effect of male voice pitch on long-term memory in women: evidence of adaptation for mate choice?

**Jelte ten Holt**, P. van Lange, H. Ijzerman & D. Balliet

The Babyface Effect, not so overgeneralized after all.

**Sigal Tifferet**, O. Gaziel & Y. Baram

I should learned to play the guitar: Guitar increases Facebook attractiveness.

**Katherine Valentine**, N. Li, D. Perrett & L. Penke

Taking a man at face-value: the role of facial ratios and dominance in mate choice at speed-dating events.

**Marco Varella**, J.H. Ferreira, L. Cosentino & V. Bussab

Evolutionary implications of sex differences in aspects of musicality: cross-cultural sample from Brazil, Europe and Canada.

**Tia Walters**

Oh no she didn't: female intrasexual competition is partly mediated by characteristics that men find attractive.

**Agnieszka Zelazniewicz**, M. Babiszewska & M. Just

Female voice characteristics and susceptibility to sexual infidelity.

#### **Group 10. Personality.**

**Dariusz Danel**, A. Zelazniewicz, N. Nowak & A. Tomaszewska

Can the adult romantic attachment style be a shield against the premenstrual syndrome?

**Marco Del Giudice**

Sex ratio dynamics: a plausible, powerful source of fluctuating selection on personality.

**Robin Kramer**, J. King & R. Ward

Identifying personality from the faces of humans and chimpanzees: evidence for a shared signalling system.

**Vera Pivonkova** & A. Rubesova

Adequacy of attributions personality characteristics based on 2D and 3D facial representation of judged individual.

**Thomas Pollet**, G. Stulp & M. Stirrat

Narrow-faced males are more likely to die from contact violence than wide-faced males.

**Michele C. Quist**, C.D. Watkins, F.G. Smith, L.M. DeBruine, & B.C. Jones.

Facial masculinity is a cue to women's dominance.

**Gillian Ragsdale** & R. Foley

Parent-of-origin effects on empathy.

**Julia Robertson** & T. Hussey

Measuring sociosexuality - empirical support for the revised Sociosexual Orientation Inventory.

**Rahael Ross** & M. Lyons

The Dark Triad and childhood experiences.

**Scott Semenyna** & L. Honey

It's not just a guy thing: Female dominance and the Dark Triad.

**Siri Taxbro** & M. Lyons

Evolutionary perspectives on the development of empathy and social intelligence: the role of parenting practises.

**Kataline Trudel** & N. Pound

Feared or revered? Assessments of formidability and leadership quality from men's faces.

**Bettina Weege**, B. Fink, J. Flügge, S. Röder, N. Neave & K. McCarty

Men's personality and women's perception of their dance quality.

## Abstracts

THURSDAY, JUNE 30<sup>th</sup>

9.30-10.30: Plenary 1

**Sarah B. Hrdy - University of California-Davis, USA.**

The origin of emotionally modern humans: What it means to develop and evolve as a cooperatively breeding ape.

New evidence has focused attention on the role of alloparents, in addition to parents, in the care and provisioning of immatures among our Pleistocene ancestors. In this lecture I examine the cognitive and emotional implications of what for an ape was a very novel form of child-rearing.

Allomother - Male or female group member other than the mother who helps rear offspring.

Alloparent - Group member other than a genetic parent who helps rear offspring.

Cooperative Breeder - Sociobiological term referring to any species characterized by alloparental care and provisioning of young. Alloparental care can evolve for a variety of reasons, and "cooperative breeding" need not imply that individuals always cooperate.

11.00-12.00: Morning sessions 1-3

**Session 1. Non-human primate sociality. (Pasteur)**

**Marie Charpentier**

Insights on kin selection in primates.

Because of female's philopatry and long-term mother-offspring bonds, most Old World nonhuman primate societies are structured around stable matrilines of maternally related females that are familiar with each other since their birth. In these species, selectively important social relationships occur among these maternal kin. Another very common feature of many primate groups is that reproduction is often highly skewed among males ('alpha male monopoly'). As a consequence, numerous offspring born in a same cohort are paternally related because they share a same father. However, because most of these paternal kin do not live in the same matriline, they are unfamiliar with each other. For years, the impact of paternal kinship on shaping complex nonhuman primate societies has been largely ignored. Here, I will first present some evidence of paternal kin biases in primates. Then, I will propose possible mechanisms responsible for kin discrimination among these unfamiliar paternal kin, outlining the phenotype matching hypothesis. Finally, I will give some insights about the adaptive value of interacting with unfamiliar paternal kin in a matrilineal society.

**Irene Godoy & S. Perry**

Testing Westermarck's hypothesis in a wild primate population.

White-faced capuchin monkeys (*Cebus capucinus*) in the Lomas Barbudal population of Costa Rica are known to exhibit father-daughter inbreeding avoidance, but little is known about what mechanisms of kin recognition are involved and whether inbreeding avoidance extends to other categories of kin. Demographic factors such as high male reproductive skew and long alpha tenures make it likely that alpha males are related to infants in their groups, and that many paternal sibling dyads are present within groups. Here I explore whether patterns of proximity during early development are suggestive of paternal kin discrimination or provide reliable cues to relatedness that females can later use in the context of mate choice. I present proximity data on opposite-sex dyads collected from 10 minute focal follows (N=18 infant females, 689 hours of focal data) and group scan samples from 23 infant females as well as proximity data from 11 adult focal females. I also present genetic data on paternity in the population. While there is evidence for inbreeding avoidance among alpha males and their direct descendants, no evidence for inbreeding avoidance among paternal half siblings was found. During their first year of life, females spent significantly more time in proximity of alpha males than they did near subordinate adult males, and these alpha males were much more likely to be their fathers, grandfathers, or great-

grandfathers than were subordinate males. Infant females also spent significantly more time near similarly aged peers than they did around older juvenile males in their groups. While peers were more likely to be paternal half siblings than were non-peers, females did not discriminate between such paternal siblings and more distantly related male kin. During the time period surrounding estrus, adult females spent more time in proximity to alpha males that were not present in their groups during their infancy than they did near alpha and subordinate males that were present during their infancy or subordinate males that were absent during their infancy. Data presented were consistent with Westermarck's hypothesis that close proximity during early development results in sexual aversion later in life; however, cues such as male rank and age proximity may also serve as factors females use in assessing mates. Females appear to have available multiple reliable cues for discriminating their direct paternal ancestors (fathers, grandfathers, and great-grandfathers), but cues for detecting paternal half brothers appear to be fewer and less reliable in the population.

**Oskar Burger, D. Levitis & L. Bingaman-Lackey**

Assessing variation in the post-reproductive lifespan across primates.

Reproduction and life tend to cease at very different ages in human females. As such, reproductive senescence seems to be decoupled from senescence in survival. This decoupling seems especially pronounced in humans but post-reproductive lifespans are observed in many species. Thus the human feature in need of explanation is not the existence of a post-reproductive lifespan but its length. We ask if the length of the post-reproductive period is significantly longer in humans than in other primates. To do so, we propose novel measures derived from life tables that allow for direct comparisons between human and nonhuman longevities. Reproductive cessation is measured as age M, when 95% of the population's age -specific fertility has been completed (we are measuring the post-reproductive lifespan, not the post-cycling lifespan). Cohort longevity is measured as age Z, when 95% of the population's mortality has occurred. We present phylogenetically controlled allometric regressions of Z and M on body and brain mass across the primates. We find that brain size is consistently a better predictor of both measures than body size (using AIC). We show that allometries produce extremely wide prediction intervals for both M and Z. As a result, very wide ranges of values for either would seem to follow directly from primate allometries. However, human age Z (cohort longevity) is especially well-predicted by brain size, suggesting that longevity itself is not significantly longer than expected given allometric trends. The allometries do not directly show that the post-reproductive lifespan is significantly greater in human populations, and a similar observation has led some researchers to conclude that the human post-reproductive lifespan follows directly from primate allometries and is hence not a derived trait. However, data compiled for a wide range of human populations reveals long post-reproductive periods in all groups, from the best to the worst surviving. Comparison with primate populations reveals that the proportion of years of post-reproductive life is significantly greater among humans than among even captive primates. We conclude that human post-reproductive lifespan is a derived trait and discuss the evolutionary implications.

**Session 2. Differential reproductive success. (Rondelet)**

**Marina Butovskaya, V. Burkova & A. Mabulla**

2D:4D ratio and reproductive success in East African foragers: the Hadza.

The goal of this study was to test the hypothesis, that the right hand 2D:4D ratio predicts the reproductive potential in both sexes. To test the predictions we conducted the field studies among the Hadza, traditional foragers of Tanzania. This population was selected, because they do not use any contraceptives. The field studies were conducted in 2007 – 2010. The sample size consisted of 246 adult individuals (148 males and 108 females). Anthropometry measurements and interviews were collected. Partial correlation with control for age revealed that: in males the right hand 2D:4D ratios correlated significantly with the number of children born ( $R=0,195$ ,  $p<0,040$ ), and number of children survived ( $R=0,272$ ,  $p<0,002$ ). The right hand 2D:4D ratio was a reliable predictor of fertility and infant survival, but only in males. This study was supported by grants: RFHR, # 08-01-00015a и 1101-00287a, Federal innovation program, # 16.740.11.0172.

**Martin Fieder & S. Huber**

Homogamy, offspring count and childlessness.

Assortative mating based on education, religion and other characteristics is a common phenomenon. In the present study we investigate on basis of US census data from 1980 ( $n = 670,631$  married US couples, provided by IPUMS USA) whether educational homogamy affects reproductive performance, indicated by parameters such as childlessness, offspring number and age at first marriage. We find that the proportion of childless individuals is usually minimal in women married to a husband of the same educational level. This holds particularly true in the highest and the lowest educated women. Educational homogamy is also associated with a lower average age at marriage. No obvious effect of educational homogamy on a woman's average offspring number is found. Generally, mean offspring number increases both with decreasing woman's and decreasing husband's educational attainment. In addition, on basis of the Wisconsin Longitudinal Study ( $n= 3313$  married couples), we found similar effects as regards religious homogamy: childlessness of both men and women increased if they were married to a partner of different religion than their own. As there is a high degree of educational and religious homogamy (education IPUMS sample 63%; religion Wisconsin longitudinal 86%) we conclude that by lowering the odds of reproductive failure, educational and religious homogamy may act as a selection pressure in humans.

**Sara M. Schaafsma, R. Geuze, W. Schieftenhövel & T. Groothuis.**

Handedness and reproductive success in a non-industrial society.

In past and present human societies right- and left-handers have coexisted with left-handers always being in the minority. Left-handedness, or non-right handedness, has been associated with possible fitness costs such as reduced lifespan and several health problems such as low birth weight and perinatal stress. Left-handedness is substantially heritable and possibly not a neutral trait in terms of Darwinian fitness which raises the question of why left-handedness is not yet gone extinct. In an attempt to explain the persistence of left-handedness researchers have also focused on the advantages of left-handedness. It has been found that left- or mixed-handers show increased skills in combative sports, socio-economic status, and creativity such as musical skills and they are overrepresented in both extremely low and high cognitive performers. Whether these effects have fitness consequences in terms of reproductive success has not yet been addressed. Furthermore, the studies mentioned above have investigated Western societies, populations that are not under the selection pressures in which handedness has evolved. In this study we investigated handedness and its relation with several Darwinian fitness components in a non-industrial society in Papua, Indonesia. Moreover, in the literature different methods have been used to measure handedness in which the differential contribution of strength and direction of lateralization is difficult to disentangle. We measured hand preference and asymmetry of hand skill on a continuous scale in order to differentiate between direction and strength of handedness. We measured preference of hand use in 10 ecological relevant tasks. In addition, we measured the difference in hand skill using the Annett pegboard task (measures speed of both hands in fine motor control) and accuracy in a ball throwing task in 373 adults. Darwinian fitness components were measured by means of questionnaires and included number of births, number of children that deceased, number of children that were still alive and self-reported health of the subjects themselves. We tested the effect of strength and direction of handedness on the fitness components Results show that in men strength of lateralization and not direction is positively associated with the number of children produced, but also positively associated with the number of children deceased. Strongly lateralized men tended to produce more children that were still alive at the time of testing compared with weaker lateralized men. Laterality of women had no effect on these fitness parameters. The results will be discussed within an evolutionary framework.

**Session 3. Parental influence on mate choice 1. (Antigone3)****Menelaos Apostolou**

Sexual selection under parental choice.

Asymmetrical fitness benefits between parents and offspring result in the ideal spouse not being the ideal in-law. As a consequence, parents and offspring have asymmetrical preferences for a number of traits such as beauty and good family background. Offspring, for instance, value beauty more in a spouse than their parents do in an in-law. Asymmetrical preferences lead to asymmetrical compromises which in turn lead to parent-offspring

conflict over mating. Such conflict gives the incentive to parents to control the mate choices of their offspring. Evidence from 186 societies of the standard cross-cultural sample is presented which indicates that in the majority of cases parents are successful in doing so. In particular, it is found that the typical mode of mating is arranged marriage, with parents choosing spouses for their offspring. Moreover, parental choice is asymmetrical with more control being exercised over female offspring. Parental choice is also male-biased with fathers and other male relatives exercising more control over marriage arrangements. Traits that make an individual more likely to be chosen as an in-law are selected and increase in frequency in the population, effectively making parental choice an important sexual selection force. In-law preferences constitute the primary mechanism of parental choice. Evidence from a sample of 67 pre-industrial societies from the standard cross-cultural sample is presented which indicates that parents are interested in thirteen qualities in an in-law including good family background, industriousness and wealth. Parental preferences are independent of the sex of the parent as mothers and fathers do not differentiate their preferences. Preferences are however dependent on the sex of the in-law as traits are valued differently in a daughter-in-law and in a son-in-law. Finally, parental preferences are contingent upon the subsistence type of a given society as specific traits are valued differently in agropastoral than in hunting and gathering societies. The evolutionary implications of these findings are further discussed.

**Abraham Buunk, T. Pollet & S. Dubbs.**

Parental control over mate choice to prevent marriages with out-group members in Mestizos, Mixtecs, and Blacks in Mexico.

Despite the assumption of freedom in mate choice, throughout history and all over the world, parents tend to exert considerable influence on the mate choice of their children. Using data from a rural population in the Mexican state of Oaxaca; the present research examined how parental influence may be motivated by resistance against out-group mating. Participants were 201 parents from three ethnic groups, i.e., Mestizos (people of mixed white-Indian descent, n = 102), indigenous Mixtecs (n = 64), and Blacks (n = 35). Nearly all men were farm workers or fishermen. Overall, the level of preferred parental control over mate choice was considerably higher than in Western countries, but lower than in Asian populations. Only among the Mixtecos a significant sex difference was found: men were more in favor of parental influence on the mate choice of children than women were. However, women, and especially Mestizo women, expressed more resistance against out-group mating than men did. As predicted, overall, resistance against out-group mating was a strong predictor of preferred parental control on mate choice, and more so among men than among women. This sex difference was especially pronounced in the Mestizo group – the group with the highest status. The results are discussed in the context of theorizing on mate choice and inter-ethnic marriages, and the evolutionary significance of these phenomena.

**Elizabeth Pillsworth & H.C. Barrett**

Female choice and parent-offspring conflict in human mating: evidence from the Shuar of Ecuador. Darwin's theory of sexual selection emphasizes the role of female mate choice in shaping male morphology and behavior. In evolutionary psychology, the model of female choice has served as one organizing feature of research on human mating. However, in many human societies women are reported to have very little influence over their own mating decisions; rather, parents or other kin often control the marriage decisions of daughters. This has led to the claim by some that female choice has been overestimated as a selective force in human evolution, based upon the evolutionarily novel context of modern Western sexual practices. I will present data from the Shuar, a hunter-horticulturalist society in the Amazon basin of Ecuador, to demonstrate the ways in which women exert mate choice within a paternalistic and highly controlling environment. I will also discuss preliminary data on "parental preferences" to illustrate a model for studying parent-offspring conflict in mate choice.

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12.00-13.00: Late morning sessions 4-6

**Session 4. Chimpanzee behavior. (*Rondelet*)**

**Anke F. Bullinger, A.P. Melis & M. Tomasello**

Chimpanzees (*Pan troglodytes*) prefer individual over cooperative strategies toward goals.

One of the most prominent issues in psychology and other behavioural sciences is the nature of cooperation. What makes human cooperative behaviour so unique? To explore the evolutionary origins of this behaviour and

elucidate the interplay between cognitive and motivational factors, studies with our closest living relatives, the chimpanzees, are of particular importance. Chimpanzees act together in a coordinated and efficient manner in many contexts, but it is still unclear to what extent they prefer mutualistic cooperative strategies over individual strategies toward goals. This study sheds light on the motivational foundations of cooperative problem solving in chimpanzees. Subjects were given the choice between working either individually or cooperatively with a tolerant partner toward equivalent payoffs. Overall, chimpanzees preferably chose the individual option and they did this independently of the type of reward for which they were working (food or tool). Interestingly, chimpanzees switched to the cooperation option as soon as its payoff was increased. These results suggest that chimpanzees prefer to work alone and only choose cooperation if that maximizes their reward. These results thus make a strong case for the hypothesis that differences between humans' and chimpanzees' cooperation might be less an issue of cognition and more an issue of motivation.

#### **Renato Bender & N. Bender**

The "Saci last common ancestor hypothesis" and a first description of swimming ability in common chimpanzees (*Pan troglodytes*).

It is remarkable that all extant non-human hominoids (gibbons, orangutans, gorillas, chimpanzees and bonobos) regularly drown if they fall in deep water – some cases are known from animals drowning even in rather shallow water. Among hominoids, only humans show the predisposition to interact with water in a way that regularly leads to the development of swimming ability. The most popular assumption addressing this topic states that common chimpanzees (*Pan troglodytes*) drown due to the small amount of fat tissue in this species. We falsify this hypothesis by providing first descriptions of swimming in three captive common chimpanzees. We show video footage of one of these chimpanzees during repeated and deliberate submerging and surface swimming. Our data support a different model to contextualize the loss of swimming ability in hominoids, which we call "Saci last common ancestor (LCA) hypothesis" (In Brazilian folklore Saci-Pererê is a one-legged slave child unable to cross even small streams). This hypothesis is based on the following arguments: (a) available data show that several (possibly most) primates are able to swim, although a low amount of fat tissue is a widespread feature in this group; primates (including very lean humans) with low amount of fat tissue compensate their negative buoyancy by the propulsive movements of their limbs; (b) it is parsimonious to assume that hominoids' general inability to swim instinctively is a synapomorphic trait in this group; (c) primatologists mainly agree that all extant hominoids retain many anatomical features that suggest a brachiator ancestor. Since brachiators or semibrachiators (for instance *Ateles* sp.) are reluctant to take to water, we assume that the loss of swimming ability is related to a strong adaptive focus on this specific form of arboreal locomotion. The reasons for the assumed incompatibility between brachiation and instinctive swimming are complex. On one hand, biomechanical constraints of this specific adaptation probably make it more difficult for brachiators to use their limbs for swimming. On the other hand, brachiators and semibrachiators avoid terrestrial locomotion (as observed in *Hylobatidae* and *Ateles* sp.) which consequently reduces opportunities to cross streams by surface swimming. In summary, it is the loss of the fixed motor pattern responsible for surface swimming that make hominoids regularly drown when falling in deep water, and not their negative buoyancy. The fact that humans are able to learn to swim remains one of the most striking and still widely ignored aspects in paleoanthropological discussion.

#### **Edwin van Leeuwen, K. Cronin, D. Haun & M. Bodamer**

A new look at an old 'custom': understanding the sources of variation in grooming hand-clasp behavior of chimpanzees.

The grooming hand-clasp behavior of chimpanzees has played a pivotal role in the ongoing debate over whether nonhuman animals exhibit behavior that can be labeled as 'cultural'. Classified in 1978 by McGrew and Tutin as the first observed social custom in nonhuman primates, grooming hand-clasp (GHC) is a behavior whereby two individuals each stretch one arm in the air to make contact with the other while grooming with the other arm. This behavior has been used to address questions about social customs in chimpanzees ranging from style differences between groups (e.g. Nakamura & Uehara, 2004) to transmission mechanisms (Bonnie & de Waal, 2006). However, until now, accounts of the GHC behavior have suffered from small sample sizes, resulting in the inability to scrutinize the explanatory power of individual, dyadic and group properties. In our study, we report on 1457 bouts of GHC behavior of chimpanzees at Chimfunshi Wildlife Orphanage Trust in Zambia, providing a

uniquely large data set to address previously inaccessible questions about factors that predict variation in GHC behavior. Observations were collected over a four-year period, resulting in over 160 hours of observation on four independent chimpanzee groups living in similar ecological environments (group size range: 13-41 individuals; enclosure size range: 20-80 hectares). Systematic observations revealed that 2 of the 4 chimpanzee groups engaged in GHC whereas the other two groups never exhibited GHC. These findings corroborate the crude group-differences argument made initially by McGrew and Tutin (1978). In the two groups showing GHC behavior, rates of the behavior were 4.1 bouts/hour and 10.4 bouts/hour. Hand-clasp styles were defined by the part of the body chimpanzees placed in contact with their partners (palm, wrist, forearm or other). A general mixed model approach yielded results of dyadic consistency in GHC style, meaning that in general two individuals have a predictable way of clasping compared to a random choice model. Additional analyses investigated the role of demographic and physical properties of individuals, which provided less explanatory power than the identities of the chimpanzees engaged in the GHC bouts. These data are the first to demonstrate that GHC style variation within a group is for a significant part owing to dyadic preferences, which substantiates McGrew and Tutin's initial suggestion that GHC behavior in chimpanzees is a social custom rather than a random artifact.

### **Session 5. Woman's life history. (*Pasteur*)**

**Beverly Strassmann & W. Garrard.**

Alternatives to the Grandmother Hypothesis: a meta-analysis of the association between grandparental and grandoffspring survival.

Recent research on human families has focused extensively on the Grandmother Hypothesis and Cooperative Breeding. Here we test these hypotheses by disentangling them from four other hypotheses on grandparental investment: Confidence of Paternity, Kin Proximity, Grandparental Senescence, and Local Resource Competition. Our methodological approach was a formal meta-analysis of 17 studies that tested for an association between grandparental survival and grandchild survival in patrilineal populations. Using two different quantitative methodologies, we found that the survival of the maternal grandmother and grandfather, but not the paternal grandmother and grandfather, was associated with decreased grandoffspring mortality. Thus, in patrilineal and predominantly patrilocal societies, the grandparents who are least likely to live with the grandchildren have the most beneficial association. These results are most in line with the Local Resource Competition Hypothesis. Our findings differ from those of Sear and Mace (2008) who analyzed essentially the same populations. We conclude that the primary difference is the use of meta-analytic versus more subjective approaches for synthesizing the literature. Interestingly, our results are consistent with the findings of psychological studies in developed countries (Coall and Hertwig 2010) and with the anthropological concept of complementary filiation (Fortes 1953, 1969; Goody 1962).

**Mary K. Shenk & M.C. Towner**

Why does fertility decline? Comparing evolutionary models of the demographic transition.

Evolutionary anthropologists have given significant attention to the global phenomenon of the demographic transition, especially the remarkable decreases in fertility that characterize it. The literature is crowded with competing theories and sub-theories, and scholars often call for more comprehensive, better-controlled studies that would allow us to distinguish between competing causal models—yet only limited comparative work has previously been done. This paper compares evolutionary models emphasizing decreasing risk, changing motivations for parental investment, and changing forms of cultural transmission as motivations for fertility decline. The goal is to determine which model, or combination of models, produces the most robust explanation of a rapid, recent demographic transition in rural Bangladesh.

Models are compared using an evidence-based statistical approach employing model selection techniques derived from likelihood theory. This approach allows quantification of the relative degree of support the data give to alternative models, even when model predictions are not mutually exclusive. Data come from a new survey conducted in rural Bangladesh in 2010 designed specifically for comparative testing. Results suggest that models emphasizing changing motivations for parental investment, including increasing payoffs to investment as well as increasing costs of and competition between children, are the best predictors of fertility decline. Yet findings also indicate that a full explanation involves variables from multiple models, and that important causal

synergies underlie key predictors such as education, suggesting that multiple causal pathways are likely to be implicated in the rapidity and degree of recent demographic transitions.

### **C. Athena Aktipis, R.A. Hiatt & B.J. Ellis**

#### **Breast cancer risk from an evolutionary life history perspective.**

Breast cancer risk appears to be linked to a variety of life history traits such as age of puberty, parity, reproductive timing, and menopausal age. We review the literature on breast cancer risk factors with an evolutionary life history perspective to suggest a novel unifying framework for understanding breast cancer susceptibility. Breast cancers are often grouped into hormone receptor positive (HR+) cancers, which overexpress receptors for estrogen and progesterone, and hormone receptor negative (HR-) cancers, which have normal levels of these receptors. We hypothesize that HR+ cancers will be associated with slow life history traits (e.g., fewer offspring, delayed fertility, later menopause) due to exposure to cycling hormones. Women with a slow life history strategy typically have many more menstrual cycles, increasing exposure to cycling hormones such as estrogen and progesterone and giving breast cells many more opportunities to proliferate (and evolve faster rates of proliferation and lower rates of apoptosis). In contrast, we hypothesize that HR- cancers may be associated with fast life history traits (e.g., more offspring, earlier fertility, earlier menopause) because of tradeoffs associated with faster reproductive aging. In general, fast life history strategies are associated with greater investments in earlier reproduction at the expense of somatic maintenance and repair. This may lead to higher rates of cell proliferation, more accumulated mutations, and greater receptivity of reproductive tissues to growths (which may increase likelihood of conception as well as the risk of neoplastic growths). We speculate that this may lead to greater susceptibility to HR- cancers among women with a fast life history strategy. Further, we predict that HR- cancers should be linked to cues of extrinsic environmental risk (e.g., harshness and unpredictability of early environment).

### **Session 6. Parental influence on mate choice 2. (*Antigone3*)**

#### **Hanna Aronsson**

##### **Parental influence on sexual preferences.**

We investigated whether sexual preferences for a variety of natural and cultural traits can be related to childhood exposure to these traits, as predicted by the theory of sexual imprinting. The investigated traits included, for example, tattoos, glasses, moustache, stature, body type and eye colour. In a sample of more than 5000 respondents to an Internet survey on sexual preferences, we found that, in general, there is a positive relationship between presence of a trait in an opposite sex parent and attraction to these traits in heterosexual males and females. We found no overall relationship between presence or absence of these traits in same sex parents and attraction to the traits in respondents. Possible explanations to these findings, both in terms of sexual imprinting, but also alternative hypotheses, such as conditioning and genetically inherited preferences, will be discussed. Further, possible explanations to why sexual imprinting might have evolved, both in non-human animals and in humans, will be discussed as well as the evolutionary adaptive function of a flexible learning mechanism for acquisition of sexual preferences.

#### **Shelli Dubbs, A. Buunk & J. Li**

##### **Parental monitoring, sensitivity towards parents, and a child's mate preferences.**

Parental influence over children's mating behavior is a burgeoning topic within evolutionary psychology. This study investigated sex differences in parental monitoring and sensitivity towards parents as well as the extent to which these measures can influence the mate preferences of children. Examples of items used to assess parental monitoring included "How often do/did your parents inquire about your romantic relationships?" and "Have your parents ever attempted to influence you to not date someone?". Examples of items used to assess parental sensitivity towards parents' opinions regarding mate choice included, "If your parents did not like someone you were dating, how likely would you end your relationship?" and "How important is it to you that your parents get along well with the person you are involved with?". Using three samples of participants (two from the United States and one from the Netherlands), it was found that females, compared to males, reported experiencing higher levels of parental monitoring and were more sensitivity towards their parents' opinions regarding mate choice. In the third sample, participants were given a survey explicitly about either their mother or father. In this

sample, children reported a higher level of parental monitoring when they received a questionnaire about their mother. It was also found amongst the three samples that sensitivity towards parents' opinions regarding mate choice predicted the importance participants rated genetic quality (e.g., physically attractive, sense of humor) and parental investment and cooperation with the ingroup (e.g., same ethnicity, not previously married or divorced) in a potential romantic partner. That is, children who reported being more sensitive to their parents' opinions regarding mate choice overall appeared to prefer a higher quality romantic partner. Interestingly though, it was found that sensitivity towards parents more strongly predicted the importance rating given to characteristics connoting parental investment and cooperation with the ingroup—characteristics that have been shown to be especially preferred by parents (relative to their children) in previous studies.

**Brendan Zietsch & K. Verweij**

Variation in human mate choices and preferences: Investigating heritability, parental influence, sexual imprinting, and assortative mating.

Human mate choices and preferences have received a great deal of attention in recent decades because of their centrality to sexual selection, which is thought to play a substantial role in human evolution. Most of this attention has been on universal aspects of mate preferences, but variation between individuals is less understood. In particular, the relative contribution of genetic and environmental influences to variation in mate choices and preferences is key to sexual selection models but has barely been investigated in humans, and results have been mixed in other species. In one study we looked at a large community-based sample of twins and their partners and parents ( $N>20,000$  individuals) to test for genetic and family environmental influences on mate choice, with and without controlling for the effects of assortative mating. Key traits were analyzed, including height, body mass index, age, education, income, personality, social attitudes, and religiosity. This revealed near-zero genetic influences on male and female mate choice over all traits and no significant genetic influences on mate choice for any specific trait. A significant family environmental influence was found for the age and income of females' mate choices, possibly reflecting parental influence over mating decisions. We also tested for evidence of sexual imprinting, where individuals acquire mate choice criteria during development by using their opposite-sex parent as the template of a desirable mate - there was no such effect for any trait. The main discernable pattern to mate choice was assortative mating; we found that partner similarity was due to initial choice rather than convergence, and also due at least in part to phenotypic matching. In another study we used data from over 4000 mostly female twins who ranked the importance of thirteen key traits in a potential partner. In women, there was significant variability in the heritability of individual trait preferences, with physical attractiveness the most heritable and housekeeping ability the least. Over all the trait preferences combined, genetic influences were highly significant in women and marginally significant in men, accounting for 20% and 19% of the variation respectively, whereas family environment accounted for a negligible 3% and 5% respectively. The divergent findings of the two studies in terms of genetic influences show that mate choices and preferences do not necessarily share the same etiology - this will require direct investigation in future research, as it has strong implications for the operation of sexual selection in humans.

14.30-15.30: Plenary 2

**Tim Clutton-Brock - University of Cambridge, UK.**

The origins of society.

To assess recent suggestions that cooperative breeding has played a central role in the evolution of human pro-sociality and cognitive development it is important to understand the causes and consequences of cooperation in non-human mammals. Cooperative interactions among mammals fall into two broad categories: **mutualistic cooperation** where cooperators share benefits and **altruistic cooperation** where some individuals consistently provide assistance while others receive it. **Mutualistic cooperation** is often a consequence of selfish coordination ('by-product mutualism') or can be maintained by shared benefits ('public goods games') or, less commonly, by various forms of reciprocity. It can occur between non-kin as well as between kin – though, unless partners are usually kin, it seldom involves costly forms of assistance. Communal breeding systems (where several breeding females share care of their young) provide an example of mutualistic cooperation. **Altruistic cooperation** is almost entirely confined to species where most group members are close kin and cooperative breeding systems (where non-breeding adults help to rear the offspring of other individuals) are an example of altruistic cooperation and, in particular, their evolution appears to have been restricted to species where average relatedness between group members is unusually high as a result of the monopolisation of breeding by a single female and male in each group and females produce multiple litters of young each year. Cooperative breeding in non-human mammals is associated with relatively protracted development but it is not consistently associated with other forms of cooperation (such as cooperative foraging) and there is little evidence that cooperative breeders show advanced cognitive development. These comparisons emphasise the contrasts rather than the similarities between the evolution of advanced cooperation in humans and other mammals. In contrast to the evolution of reproductive cooperation in non-human mammals, reproductive cooperation in humans probably evolved in groups that included multiple breeding females which produced single offspring at long intervals so that average coefficients of relatedness between group members were low. While reproductive cooperation could have stimulated the evolution of cognitive development, as recent work has suggested, the evolution of cognitive development and pro-sociality could vice versa have stimulated the evolution of reproductive cooperation or all three characteristics could have co-evolved as components of a single syndrome of human behaviour, stimulated by the development of some other capability, such as the development of language. Unfortunately, comparisons with the evolution of cooperation in non-human mammals do not allow us to differentiate between these possibilities.

15.30-16.50: Early afternoon sessions 7-9

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#### **Session 7. Evolution of human society. (*Antigone3*)**

**Tamas David-Barrett & R. Dunbar**

The evolution of a human propensity towards social stratification, and the rise of cultural institutions as constraints.

This paper offers a model that shows the relationship between evolutionarily adaptive traits concerning the human capacity to form groups, and cultural institutions limiting the group level disadvantages of some of these traits. We use an agent-based framework to generate social stratification processes in two-layer groups. We show that if information regarding communal action is distributed unequally, then social statuses can appear endogenously. We show that the emerging social status hierarchy leads endogenously to emergent social stratification among the group members, and the formation of a delineated elite clique. We show that the assignment of social statuses are adaptive responses on the individual agents' level, while increasing the group level efficiency at the cost of increasing payoff inequality. We also show that both social stratification and the formation of elite cliques decrease group-level efficiency and increase inequality. This creates a space for the evolution of cultural institutions limiting the negative, group-level consequences of stratification and elite delineation. We provide empirical evidence to support the findings of our model.

**Joey T. Cheng, J.L. Tracy, T. Foulsham, A. Kingston & J. Henrich**

Dual paths to power: evidence that dominance and prestige are distinct yet viable avenues to social status.

The pursuit of social status is a recurrent and pervasive challenge faced by people in all human societies. Yet, the precise avenues through which individuals compete for status remains unclear. This research aims to test the impact of two evolved fundamental strategies—Dominance (the use of force and intimidation to induce fear) and Prestige (the sharing of expertise or know-how to gain respect)—on the attainment of social status, conceptualized as the acquisition of (a) perceived status, (b) influence over others, and (c) others' visual attention. Specifically, Study 1 examined the process of hierarchy formation among a group of previously unacquainted individuals, who provided round-robin judgments of each other after completing a collaborative task. Results indicated that the adoption of either a Dominance or Prestige strategy promoted judgments of high status by group members and outside observers, and greater success on a behavioral measure of social influence. In Study 2, a new sample of participants viewed brief video clips of Study 1's group interactions while their gaze was monitored with an eye-tracker device. Results showed that both Dominant and Prestigious targets received greater visual attention than low-status targets. In addition, detailed coding of Study 1 participants' behaviors during the collaborative task revealed that targets high in Dominance and Prestige displayed distinct, theoretically predictable verbal and nonverbal behavioral patterns (i.e., behaviors indicative of intimidation and entitlement vs. social attractiveness, respectively). Together, these findings provide evidence that Dominance and Prestige are distinct strategies for attaining social status in human groups, and both are effective even within the same group, and even when Dominant and Prestigious individuals compete directly for power.

**Pavel Duda & J. Zrzavý**

Evolution of human socio-cultural traits: a phylogenetic (supertree) approach.

Nowadays, the evolution of human socio-cultural traits is frequently investigated via phylogenetic comparative approach on the basis of linguistic cognate-based phylogenies. The possible limitations of this approach lie within the exclusive use of linguistic phylogenies. The studies that use language as the only proxy for human population history and simply synonymize "language" and "people" phylogeny, may be susceptible to type I errors. In order to elucidate human population history and pattern of evolutionary change of selected socio-cultural traits on a global scale, we created the first composite phylogenetic supertree of 574 human populations (ethno-linguistic groups) on the basis of 129 recently published phylogenetic hypotheses based on genomic, genetic and linguistic data, utilizing the matrix representation with parsimony (MRP) method. Subsequently, we used the obtained supertree topologies for optimization of selected socio-cultural traits (e.g. social mating system, wealth transfers at marriage, postmarital residence, evolution of socio-political complexity, male genital mutilations) in order to investigate patterns of cultural macroevolution and coevolution of these traits, and to reconstruct the ancestral states present in various proto-societies. Our results suggest that various graphic representations of shared descent, relatedness, or phylogeny, based on various types of data, can be utilized by the MRP method to obtain detailed and comprehensive phylogenies. The resulting topology of the supertrees is in line with both traditional and modern views of human phylogeography, population movements and fundamental relationships of the major world cultures. Our results also demonstrate that phylogenetic comparative method can be successfully applied to large composite phylogenies. The analysis of present-day cross-cultural variation allows to directly address the questions regarding evolutionary processes concerning social organization, cultural practices and ecological adaptations in prehistory. The tentative maximum parsimony and maximum likelihood character optimization suggest that some socio-cultural traits are highly conservative, showing a strong association with phylogeny. However, some reconstructed ancestral states (e.g. ancestral mating system and wealth transfers at marriage in Indo-Europeans) contradict those derived from recent cultural-phylogenetic studies based on linguistic phylogenies. The cause of this incongruence could lie within the different topology of the relevant sections of the phylogenetic supertree based on total evidence and linguistic phylogenetic trees. It could also be caused by different taxon sample, different character scoring, or by the absence of linguistic outgroup "taxa", that might ultimately obscure the evolutionary polarity of the investigated character states.

### **Micael Ehn & M. Enquist**

Specialization leads to feedback cycles in cultural evolution.

Human specialization, unlike that in most animal species, is culturally rather than genetically determined. Instead of genetic differences, we specialize by distributing knowledge between individuals. This lets us to adapt to new circumstances much faster than genetic evolution would allow. Cultural specialization also allows for a large diversity and makes specialization a potentially important part of cultural evolution. We wanted to investigate what role specialization plays in cultural evolution. Is it an outcome or a driving force and what other interactions are there? We compiled theories and data from different fields to get an overview of what interactions we can expect and how cultural evolution is affected by specialization. We also conducted an empirical study and developed novel mathematical models to allow formal examination of proposed theories and validation against data. We find support in both empirical and theoretical studies for two feedback cycles including cultural evolution, cultural cumulation and specialization. Cultural evolution drives specialization since more knowledge means higher learning costs, eventually making specialization necessary. Our models also indicate that specialization increases the innovation rate, therefore creating a ratcheting effect. The second cycle occurs because specialization increases productivity and therefore surplus. This surplus can be translated into an increased population, which in turn has been shown to lead to increased cultural cumulation. Examination of the two feedback cycles show that their relative importance for cultural evolution may have shifted over the course of human history. There is evidence that productivity increases faster than linear with increased specialization and for most of human history, increased means have resulted in increased population. Therefore, increased specialization would result in a faster than linear increase in population and cultural cumulation. In modern societies however, increased means often do not lead to increased population size. Further, there is a limit on how fast a population can grow. There is evidence that a larger amount of cultural knowledge leads to an increased rate of cultural evolution due to, for example, recombination. When this increase in cultural cumulation causes specialization to increase fast enough, the population growth can not keep up and the relative importance of the shorter feedback cycle that does not include population size will increase. We conclude that specialization is an integral part of cultural evolution, both as a driver and an outcome of other aspects of cultural change.

### **Session 8. Marital dissatisfaction. (*Rondelet*)**

**Glenn E. Weisfeld**, L.M. Dillon, N.T. Nowak, J. Ranson, C.C. Weisfeld, E.O. Imamoglu, M. Butovskaya & J. Shen

Conflict in marriage: universal findings and variations in five cultures.

American social scientists have often identified arguments over money and property as primary sources of conflict in marriage. When conflict leads to divorce, US court data suggest that the most intense arguments may continue to occur over financial resources and the couple's children. From an evolutionary point of view (e.g., Betzig, , 1989; Buss, 1989), one might argue that, while arguments in the above-mentioned domains would be common, the most troubling conflicts between husbands and wives are likely to be seen in the domains of sexual interactions and kindness or lack of kindness towards one's spouse. In this study married couples from the USA, England, Russia, Turkey and China (2,600 total couples) were given the Marriage and Relationship Questionnaire (MARQ) of Russell and Wells (1986). This multi-purpose questionnaire contains a scale called "Problems with the Partner" which includes seven items from the MARQ, related to quarreling and irritating or embarrassing each other. The Problems with Partner scale shows reasonably good gender and culture invariance, with Cronbach's alphas ranging from .7 to .8 across all groups. Thus, the scale was considered to be a fairly robust criterion measure for assessing trouble in the marriage, across different cultural settings, in contrast to something like considering divorce, which is not a realistic option in some cultures. Based on the earlier literature on conflict between spouses, we entered the following predictor variables into a linear regression: money problems, sex problems, division of labor issues, disagreements about raising children, and spousal lack of kindness. Adjusted R Squared values ranged from .21 to .51. Across the ten groups (two genders, five cultures), lack of kindness in one's spouse was the most significant predictor, in all ten groups. Sex problems was significant in nine groups, with husbands in the USA being the sole exception. Division of labor disagreement was a significant predictor in nine groups, with Turkish wives being the sole exception. Russian husbands and wives were the two groups for whom money problems did not predict problems in the marriage; husbands and wives in the USA were the only

group for whom disagreements over the children did not predict problems for the couple. Discussion focuses on the role of kindness to one's partner in long-term relationships.

**Nivia Lopes, W.T. Hattori, F. Lopes, N. Boccardi, V. Sampaio & M.E. Yamamoto**

"It's not you, It's me": biological and social influences on marital dissolution.

Reproduction is a major concern from an evolutionary perspective. Nevertheless, modulation of reproductive behavior may arise from social change, which takes place on a much faster pace than evolutionary ones. Divorce, for example, has been legalized only in 1977 in Brazil, and that fact has introduced a very important social influence in the behavior of individuals that are not happy with their marriage. We investigated how the variables marriage length, number of children, and husband/wife ages by the time individuals requested the divorce, may have influenced litigious divorce processes in two periods: in 1980 (when most formal separation cases were transformed in divorces) and in 2000. The processes were studied in Natal, Brazil, and were analyzed according to the gender of the divorce requestor. We found that different variables influenced male and female's decisions. In the processes that husbands' request divorce, marriage length and wives' age were higher in 2000 than in 1980. In the processes in which wives request divorce, there was no difference in women age on both periods since they still were on a reproductive age. We also found that, in relation to the wives's decision, the number of children decreased in the recent period compared to the previous one. These results suggest that, for women, requesting the divorce in an earlier age might be a behavioral strategy for assuring new reproductive events, considering that age is an important constraint for women's reproductive success. On the other hand, men depend on the female to reproduce, and women today have fewer children, delaying pregnancy, what may explain the higher marriage length and higher women age in 2000 processes, so men appear to postpone marriage break-up. Our findings show a greater influence of biological factors on the divorce decision in women, whereas men tend to adapt their behavior to cope with social changes related to marriage patterns. Taking together, these data point out how biological and environmental factors intertwine on the expression of human reproductive behavior.

**Gert Stulp, A. Buunk & Simon Verhulst**

Mutual mate choice results in couples where preferences of neither sex are optimally satisfied.

Preferences for partner traits may differ between the sexes. Due to differences in preferences and mutual mate choice (i.e. that both sexes choose their partner), one or even both individuals from a pair may end up with a less than ideally preferred partner. Previous research has shown that preferences for partner height are different between the sexes, and that actual pairing (i.e. parents) with respect to height is different from indicated preferences. To examine the hypothesis that the discrepancy between preferences and actual pairing is a consequence of mutual mate choice, we examined data from over 150 HurryDate speed-dating events (covering over 5,000 males and females). In these events, men and women interacted with each other for three minutes and subsequently indicated if they wanted to have future contact (their preference). Men and women who preferred to have future contact with each other, 'matches', were given each other's contact details. In line with previous research, we show that preferences for partner height are different between the sexes. Furthermore, we show that the heights of the resulting pairs, 'matches', are different from both male and female preferred height. The heights of the resulting pairs were similar to those found in actual couples. Together, these results indicate that the sex differences in mate preferences combined with mutual mate choice results in both sexes not getting what they want.

**Maryanne Fisher, J. Garcia & A. Merriwether**

Who's to blame? Attribution of blame in infidelity.

Infidelity is one of the most well studied topics within evolutionary social psychology. Over the past two decades, researchers have devoted considerable effort to understanding sex differences in perceptions of emotional versus sexual infidelity. Some have extended that work to examine forgiveness following an infidelity. Although there has been substantial research into this area, there has yet to be an investigation into the allocation of blame, which seems particularly noteworthy given that it may influence the likelihood of forgiveness and relationship reconciliation. In the current study, we examine how young adults attribute blame. Our participants were university students (246 women, 128 men) in upstate New York. We created short vignettes that varied in the sex of the perpetrator of the infidelity, and whether it was sexual and emotional infidelity. We hypothesized women would be blamed more than men when the perpetrator of sexual infidelity, due to sexual double

standards. Likewise, we expected women who were the third party would be blamed more than men, regardless of the type of infidelity. We also hypothesized that an individual participant's personal infidelity experiences would influence their distribution of blame. We tested our hypotheses in two ways. First, participants reported how much they would blame the perpetrator, that person's mate, and the third party, such that the scores for all 3 people total 100%. We also asked them to report, using a 10-point Likert scale, how responsible they would consider each of the 3 people. Finally, in order to examine the potential influence of past cheating behavior, participants reported whether they had ever cheated or been cheated on by a mate. Our hypotheses were generally supported. We will discuss the importance of examining individuals' own behavior when studying infidelity.

### **Session 9. Kinship. (*Pasteur*)**

**Daniel Krupp, L.M. DeBruine, B.C. Jones & M.L. Lalumière**

Opposing effects of self- and antiself-resemblance suggest the perception of both positive and negative relatedness.

Recent research suggests that humans, like numerous other organisms, have mechanisms designed to detect the genetic relatedness of novel social partners. Specifically, humans use phenotype matching mechanisms based on facial similarity to inform relatedness judgments. Furthermore, self-resembling faces appear to elicit attributions and behavior indicative of relatedness assessments. However, it is not yet known whether humans (or any other organism) can discriminate positively and negatively related individuals—those social partners more and less likely than chance, respectively, to bear identical copies of the actor's alleles—in the environment and act accordingly. Here, we extend previous work by introducing a putative cue of negative relatedness: antiself-resembling faces, digitally constructed by computing the difference in shape between a participant's face and an average face of the same sex, age, and ethnicity, and then subtracting 50% of this difference from an opposite-sex average face. Participants were presented with pairs of antiself-resembling and similarly manipulated control faces and asked to choose which face in each pair they found more (1) trustworthy, (2) attractive as a long-term mate, and (3) attractive as a short-term mate; participants were also asked the same questions of pairs of self-resembling and control faces. Analyses reveal a significant main effect of self-resemblance: self-resembling faces were preferred over control faces, whereas control faces were preferred over antiself-resembling faces. Moreover, participants significantly disliked antiself-resembling faces in trusting attributions but not in short-term attractiveness attributions, an effect that mirrors previous findings of context-specific effects of self-resemblance. To our knowledge, this is the first evidence that any organism can make negative relatedness judgments, and suggests potential for the adaptive allocation of spiteful behavior among humans.

**Lisa M. DeBruine, B.C. Jones, C.D. Watkins, S.C. Roberts, A.C. Little, F.G. Smith & M.C. Quist.**

Domain specificity in the effects of opposite-sex siblings on attitudes to cues of kinship.

Cues of genetic relatedness to familiar individuals, such as maternal-perinatal association and co-residence duration, modulate prosocial and inbreeding avoidance behaviours towards specific potential siblings. While these findings have been interpreted as evidence that these cues directly influence the perceived probability of genetic relatedness to the familiar individuals, it is unknown whether such cues also activate inbreeding avoidance mechanisms more generally (i.e., even towards unfamiliar individuals who display cues of kinship). Here, we show that the presence of opposite-sex siblings influences inbreeding-relevant social perception of facial resemblance, but not prosocial perceptions. Women with brothers were less attracted to self-resembling, unfamiliar male faces than were women without brothers, while both groups found self-resemblance to be equally trustworthy for the same faces. Our findings provide evidence that inbreeding avoidance mechanisms are generally activated by experience with opposite-sex siblings and demonstrate a dissociation between mechanisms that regulate inbreeding and the mechanisms that regulate prosocial behavior towards kin.

**Maria Teresa da Silva Mota, W.T. Hattori & A.I. Alencar.**

A preliminary view of violence towards children and adolescents in a northeastern state of Brazil.

Sexual abuse and violence against children are often in the news media nowadays. Its impact is perceived in developed and underdeveloped countries. Studies point out that most abuse records, including murders, are performed by non related individuals. In Brazil, a study developed in the Southeastern State of Espírito Santo

supports this idea. Given the great social economic diversity among Brazilian regions, we evaluated the incidence of child and adolescent abuse in the state of Rio Grande do Norte, in the Northeast of Brazil, based on the violence records towards victims up to 17 years old in the Police Unit for Children and Adolescents between 2006 and 2010. We analyzed the relatedness between the abusers and their victims; the abuse recorded in capital of the State, the surrounding areas and the countryside; and compared the abuse records in the four districts that compose the capital of our State, Natal. We found that the main reported abuser was the mother, followed by the father, stepfather and stepmother, other relatives and non related individuals. Regarding the distribution of abuse, the highest levels were verified in surrounding areas when compared to those recorded in the capital and countryside. In the capital of the State, most of the records were found in the western area. Our data showed the opposite trend of most studies regarding the abuser's kinship. Nevertheless, previous studies suggest that mothers, while living with their partners that are not the biological fathers of their children, tend to assume responsibility of the abuse as an attempt to protect their partners. According to the evolutionary perspective, abuse performed by non related individuals can be better justified and understood than those performed by related ones. Once the investment by non-genetically related individuals would represent a greater reproductive cost, it would be expected higher levels of abuse towards children and adolescent by non relatives. Moreover, areas with more reports of abuse are the ones with the lowest income and higher population density per household, which support the hypothesis that the lower income would be a proximate mechanism to explain neglect or infanticide.

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#### 17.10-18.30: Afternoon sessions 10 – 12

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#### **Session 10. Coalitional psychology 1. (Pasteur)**

**Mark Flinn & Davide Ponzi**

Hormonal mechanisms for human coalitionary behavior.

Coalitions are one of the most striking aspects of human behavior. All societies recognize alliances among communities, usually based in part on kinship and marriage. Inter-group aggression is ubiquitous, often deadly, fueled by revenge, and can have devastating effects on general human welfare. Given its significance, it is surprising how little we know about the neurological and physiological mechanisms that underpin human coalitionary behavior. Here we examine hormonal responses to coalitionary social events in a rural Dominican community, with the objective of understanding differences between in-group and out-group competition. Our analyses indicate: (1) adult and adolescent males do not elevate testosterone when they defeat their friends, but they do elevate testosterone when they defeat outsiders; (2) pre-competition testosterone and cortisol levels are negatively associated with strength of coalitionary ties; and (3) adult males usually elevate testosterone when interacting with adult women that are potential mates, but in a striking reversal, they have lower testosterone if the woman is a conjugal partner of a close friend. These findings suggest that dampening of aggression and competition among friends and allies is biologically embedded in what may be unique ways among humans.

**Sergey Gavrilets.**

Dynamics of alliance formation and the egalitarian revolution.

Arguably the most influential force in human history is the formation of social coalitions and alliances (i.e., long-lasting coalitions) and their impact on individual power. Understanding the dynamics of alliance formation and its consequences for biological, social, and cultural evolution is a formidable theoretical challenge. I develop a stochastic model describing the emergence of networks of allies resulting from within-group competition for status or mates between individuals utilizing dyadic information. The model shows that alliances often emerge in a phase transition-like fashion if the group size, awareness, aggressiveness, and persuasiveness of individuals are large and the decay rate of individual affinities is small. With cultural inheritance of social networks, a single leveling alliance including all group members can emerge in several generations. My results suggest that a rapid transition from a hierarchical society of great apes to an egalitarian society of hunter-gatherers (often referred to as "egalitarian revolution") could indeed follow an increase in human cognitive abilities.

### **Oliver Curry & Michael Bang Petersen**

Coalitional politics: a natural experiment on coalitional reasoning in a multi-party election.

Humans evolved in a social world characterised by intense coalitional cooperation and conflict. Recent research suggests that, as a result, humans have been equipped by natural selection with cognitive mechanisms for identifying and tracking coalitions, and that this coalitional psychology is activated in the evolutionary-novel context of modern party politics. Here we employ the 'who said what' memory confusion protocol before and after the UK 2010 General Election to test several additional predicted features of coalitional psychology. In each study, subjects were presented with discussions between members of two of the three parties, and by analyzing errors in recall, we obtained measure of how strongly these members were categorized along partisan lines. We predicted that coalitional psychology should (1) constantly keep track of dominant coalitions in one's environment, (2) be particularly vigilant to coalitional dynamics that affect one's own welfare and (3) continuously update one's understanding of alliance patterns. The results provide evidence for all three predictions. First, the two dominant parties (Labour and Conservatives) engage coalitional categorization more than the less dominant party (Liberal Democrats). Second, political categorization is higher among individuals who considered themselves supporters of a political party and, higher still in situations in which ones own party was involved. Third, coalitional categorization is sensitive to changes in patterns of cooperation between the political parties in the real world. After the election, the degree to which participants distinguished the two parties that formed a coalition government (Conservatives and the Liberal Democrats) decreased; no such decrease occurred in comparison with Labour.

### **John Tooby & L. Cosmides**

Coalition first, beliefs second: what accounts for the content of political issues?

A simple model of political beliefs is that people as individuals have goals, and join together with like-minded others to attempt to advance policies that rationally realize these goals. An alternative view arises from the hypothesis that our ancestors have been engaging in political conflict for tens of millions of years, and have adaptations that evolved to make them effective players in political games. On this view, politics is individually-anchored coalitional competition. As coalitional competition, its products are the achievement and maintenance of coalitional power and status; power- and value-realizing social coordination; the identification or manufacture of internal and external rivals; the social exclusion of others from resources and positions of power; the delegitimization of rivals, etc. A central feature of conflict over positional resources is that it is experienced as zero-sum between coalitions. In this zero sum competition, players seek to recruit swing support for their own coalitions by creating attractive coalitional identities for themselves and unattractive identities for their rivals, especially through the manufacture and elaboration of political issues. On the standard view that parties exist to advance pre-existing goals, one of the most puzzling features of politics is the surprising content of these issues. There is an indefinitely large set of issues that could form the cores of conflicts over collective decision-making. Yet those that become operative and salient as the object of partisan conflict and allegiance are a tiny, eccentric subset often largely unconnected to issues with real, major utilitarian consequences for the great majority of the political community (e.g., flag-burning, same-sex marriage, animal rights, fetal rights, oil exploration in the arctic, subsidies for the arts, presidential perjury in sexual harassment suits). Even more striking, there are higher order correlations (positive and negative) in adherence to positions that are logically and factually unconnected to each other (e.g., support for arts subsidies; support for abortion rights) and even logically unconnected to politics (e.g., tastes in food and art). Here we advance a number of hypotheses to account for the content and clustering of political issues, including the utility of manufacturing low-cost distinctions between rivals and one's own coalition; similarity in parametric adaptations such as personality factors; signal detection effects acceptance of facts as proxies for coalitional loyalty; outrages; and the fabrication of useful social boundaries in the service of social dominance and exclusion.

### **Session 11. Psychological sex differences. (*Rondelet*)**

**Casey S. McGlasson, J. Lorince, D.J. Crandall & P.M. Todd**

Testing an adaptive explanation for sex differences in color preferences with online photos.

Where do sex differences in color preference come from? Hurlbert and Ling (2007) give an evolutionary explanation related to the sexual division of labor, arguing that the cross-cultural female preference for red that

they found arises from the adaptive benefit to foraging females of seeking out a red object on a green background (e.g., fruit against leaves). Other researchers have argued that color preferences do not have this universal quality, and are instead related to object preferences and associations between objects and colors (Palmer & Schloss, 2010). We propose a novel approach to studies of sex differences and culture differences in color preference using a vast database of over 10 million color photographs on Flickr, an online photo-sharing network, for which we can determine the sex of the photographer. By analyzing the color spectra of photos that people choose to upload, as well as of photos that others choose as a “favorite”, we can assess color preferences on a much larger scale than can be done in a lab experiment. Here we compare the color distributions of photographs taken by men versus women to test for a general red-shifted preference among women across cultures, followed by a comparison for both sexes between cultures to assess the magnitude of cultural effects. Because uploaded photos may reflect the photographer’s courtship display behavior as well as or more than their preferences (showing what photographers think members of the opposite sex would like to see), we also analyze sex differences in color spectra of those photos rated as favorites by men and women. We compare these color spectra to natural spectra encountered by humans as a default hypothesis that the photos merely manifest environmental statistics rather than preferences.

### **Henry Markovits**

Males are better than females at discovering a social rule by observing interactions.

There is now a great deal of evidence that males and females differ in some basic forms of information processing that reflect gender differences in social organization. By the end of preschool, males interact more in groups compared to females who interact more with one individual at a time in dyads unconnected to each other (Benenson, 1990; Benenson, Apostoleris, & Parnass, 1997). Recent evidence showing preferences for group-like versus individual stimuli in 6-month-old male infants compared to same-age female infants is consistent with the idea that this difference has biological underpinnings (Benenson, Duggan, & Markovits, 2004; Benenson, Markovits, Muller, Challen, & Carder, 2007). This basic difference has important implications for the way that social information is processed in females and males. Females and males should show different patterns of information processing related to information that is more or less relevant to their specific social environments. One such form of information that has been recently shown to distinguish males and females concerns short-term encoding of spatial relations among group members (Markovits & Benenson, 2010). In the following, we extended this argument to a novel form of social information processing. Specifically, we hypothesized that males should be more efficient than females in extracting social cues from observing interactions involving other social actors. To look at this, we produced animations that simulated series of interactions between two social actors which varied on a variety of dimensions. Interactions were successful or not depending on a single dimension. Participants predicted the outcomes of each interaction, and then were told the actual result. In Study 1, adult participants were asked to discover the gaze rule which determined the outcomes of each interaction. Results show that males were more efficient than females extracting the correct gaze rule. Study 2 presented preschool children with a similar task using a more clearly observable cue, playing a guitar or not. Boys were able to explicitly come up with the correct rule more often than girls. In addition, performance on this task was related to individual differences in social behavior when working memory was factored out. These results are consistent with the hypothesis that males are superior in processing social information related to functioning in larger social groups than females.

### **Ana Maria Fernandez**

The feeling of jealousy: physiological reactions to scenes of infidelity.

Considering the influential contributions of James (1894) for understanding the evolved function of emotions that are part of the human repertoire, the adaptive purpose of romantic jealousy is reviewed. Buss (2009) has explained the specific role of jealousy preventing male investment in unrelated offspring and women’s loss of a reproductive partner’s resources, and the overall strategic implications of sex-differences in mating. It is also possible to integrate advances linking specific psychophysiological functions to particular emotional motivations that have an evolved theoretical explanation, such as the overall bodily activation of some negative emotions for action and defensive withdrawal (Lewis, Haviland-Jones, Barret, 2008), which could characterize the adaptive design of male and female jealousy, respectively. The research consisted in the experimental elicitation of jealousy in the laboratory using forced-choice sexual and emotional infidelity scenarios, and an exploratory

method presenting the hypothetical infidelity situations with short scenes from Hollywood movies. It was expected that emotional infidelity would be more distressing for women and would lead them to show a pattern of heart rate and respiration activity different from men (possibly resembling pain), and that men would be more distressed than women and would show a physiological pattern more similar to anger activation when responding to sexual infidelity. 36 individuals from both sexes participated in the investigation. The results confirm sexual differences in the kind of infidelity that is more disruptive by sex, with consistent physiological patterns that allow for the theoretical interpretation of female pain and male anger based on the factor analysis of their heart and respiratory activity. It is suggested that the psychophysiology of women's jealousy constitutes a complex factor that resembles the composition of defensive withdrawal, while in men there is only one big physiological factor that may reflect the configuration of a quick preparation for aggressive action. The results are discussed in light of evolutionary principles, yielding knowledge about the assimilation of romantic jealousy in the present as an emotional response to the adaptive problems of the past (Tooby & Cosmides, 1992). Grant: Usach – Ministerio de Educación: Proyecto USA0607, MECE Educación Superior 2.

### **Roland Tisljar & T. Bereczkei**

Gender-specific predictors of mate preferences in humor.

Objective: Both men and women prefer partners for relationship, who have a good sense of humor (Feingold, 1992). But little is known about why we love humor, and what does it tell us about the other person. Humor is a multidimensional construct that includes different components and abilities (Kaufman et al., 2008). For example, women prefer men with a productive humor, but men are not attracted to funny women, suggesting the sexes mean different things by "good sense of humor". Because men and women use different mating strategies, we hypothesized that humor preference in men and women is influenced differently by their self-assessed mate value and by their adult attachment style. Methods: Participants in this study (98 men and 82 women) provided self-reported measures by filling the Humor Styles Questionnaire (Martin et al., 2003), the Adult Attachment Scale (Collins & Read, 1990), and answering questions about how they view their own mate value dimensions (Gangestad & Simpson, 2000). Self-perceived ranks on the attachment dimensions (Anxiety, Avoidance) and on the main factors of mate value (warmth-trustworthiness, vitality-attractiveness, status-resources) were used as predictors. The dependent measures were the participant's mate preference with regard to different humor styles (affiliative, self-enhancing, aggressive, self-defeating). Results: Linear regression analysis revealed that women with lower ranks in the avoidant attachment style and self-perceived status-resources showed more preference towards affiliative humor in possible partners. The same pattern in men was obtained for participants with similar avoidance but with relatively high warmth-trustworthiness scores. In men, but not in women, even higher levels of warmth-trustworthiness and lower levels of anxiety increase preference for romantic partners with high self-enhancing humor. None of the current measures was associated with mate preferences for negative humor styles (aggressive and self-defeating humor) in either sex. Conclusions: In the everyday sense, "good sense of humor" suggests a socially adaptive usage of humor, which has been termed the affiliative humor style (Martin et al., 2003). Irrespective of gender, preference for this kind of humor was negatively affected by the person's level in the avoidance dimension of attachment. Women with self-assessed characteristics, such as ambition, successfulness, and financial stability (high scores in the status-resources dimension) show more preference for affiliative humor, whereas in men, a similar preference correlates with their level in the warmth-trustworthiness dimension. These results suggest that persons with gender-atypical mate value strengths show higher preference for humor, which presumably allows minimizing conflicts within future relationships.

### **Session 12. Mate choice. (*Antigone3*)**

#### **Thomas Pollet & G. Stulp.**

Age differences in couples from around the globe: A test of the 'male older norm' covering 47 countries using a simulation approach.

One of the earliest findings from evolutionary psychology is that men tend to prefer younger women, whereas women tend to prefer older men. Previous research has documented cross-cultural evidence for these preferences (Buss 1989). Moreover, while these preferences for age differences are well-documented, little is known on whether they are actualized in mate choice. Using comparable demographic surveys we investigated age differences in married couples, assortative mating for age within these couples and the presence of a male

older norm across 47 different countries. The data are from the IPUMS project ([www.ipums.org](http://www.ipums.org)) and consist of representative national samples covering over 4,000,000 married couples (18 to 35 years old). Across the 47 countries, we found a sizeable mean age difference within couples, with males being on average older than females ( $M= 2.9$  years; range: 1.34 (USA) years to 7.1 years (Guinea); Cohen's  $D= .86$ ). Interestingly, cross-cultural variation in age differences within couples is smaller than variation in a given population given that the variance within countries was larger than between countries (variance within: 12 years; variance between: 2 years), indicating that. In addition, we found evidence for assortative mating across all these countries (mean  $r= .62$ ; range: .34 (Senegal) - .82 (India)). Subsequently, we used a modeling approach in R, where we simulated random mating with respect to age in each country 10,000 times and compared this to the actual distribution of age differences within couples for this country. For every country we found evidence for a 'male older norm', meaning that marriages where males were older than females were much more common than expected by chance (all  $p<.0005$ ). The simulation approach also allowed assessing which age brackets are overrepresented across countries (mode: -1 to 4 years). In line with previous studies on mate preferences, our study suggests the existence of a cross-cultural male older norm in actualized mate choice. Findings are discussed with reference to the current literature on human mate choice, with an emphasis on cross-cultural differences and similarities in preferences for traits in a spouse. Finally, we discuss biological market extensions of our approach.

**Noémie S.A. Becker, P. Touraille, A. Courtiol, A. Froment & E. Heyer**

Mate choice and stature in African Pygmies.

Short stature in African Pygmies has been the subject of studies from various scientific fields such as anthropometry, endocrinology, life-history and genetics. However none of the many evolutionary hypotheses proposed can explain both the short stature of Pygmies and the variability observed among various Pygmy populations. The influence of stature in mate choice has been shown in various human populations. Particular mate choices concerning stature could play a role in the short stature of Pygmy populations through sexual selection. We have gathered anthropometric and familial data from 72 Baka Pygmy couples and 27 neighbouring Nzimé Non-Pygmy couples from Cameroon. Mating patterns common to many human populations (assortative mating, male taller norm) have been tested in both populations as well as the influence of stature on reproductive success. Evidence for male taller norm and assortative mating has been found in Pygmies and Non-Pygmyes. Stature has been found to be positively correlated with the number of serial marriages contracted by men of both populations and the relation was negative but not significant in women. An indirect measure of reproductive success was not influenced by stature. Altogether we did not find any major advantage for shorter individuals in mating or reproduction in the Pygmies. Mating patterns concerning stature in Pygmies are very similar to these of Non-Pygmyes and of many other human populations. Sexual selection does not seem to play a role in Pygmies' short stature and the evolution of this phenotype remains thus unclear. In another study we have shown that the short stature of African Pygmies is partly due to genetic factors. The study of these potential genetic factors could enable us to understand how Pygmies' height has evolved thanks to estimates of intensity and timing of natural selection.

**Wallisen Tadashi Hattori, F. Castro, F. Lopes & M.E. Yamamoto.**

Tell me who the best in your town is: Differences and similarities in mate choice among Brazilian adolescents.

The process of mate choice has been widely investigated in adults, studies that point for universal patterns and cultural influence. However, few studies have focused on the development of these patterns at the beginning of reproductive age. In order to verify the occurrence of universal patterns and cultural influences on the mate choice process, we interviewed 1,052 students, aged between 14 and 17 years, 657 girls (Mean  $\pm SD = 15.49 \pm 0.63$  years) and 395 boys (Mean  $\pm SD = 15.57 \pm 0.62$  years), from seven Brazilian cities: Belém, Curitiba, Goiânia, Natal, Picos, São Paulo e Vitória. We applied a questionnaire after approval was obtained from the Research Ethics Committee of the Federal University of Rio Grande do Norte (UFRN), and consent from the school principals, adolescents and their parents. The students completed the questionnaire individually, on a volunteer and non-remunerated basis. We asked their sex, age, and an assessment in a 5-points Likert scale of 12 traits in a potential romantic partner: Ambition/Willingness to work, Chastity, Civility and intelligence, Desire for children and marriage, Emotional stability, Fidelity, Good financial prospects, Good humor, Jealousy, Kindness, Physical attractiveness, and Social status. We applied a General Linear Model Multivariate to compare the evaluation a

potential romantic partner using twelve traits as dependent variables, Sex and City as independent variable, and Bonferroni test as Post hoc. The significance level adopted was 5%. Our results show no sex or origin differences for jealousy, the trait evaluated as less important. Although, we found sex differences for Ambition/Willingness, Civility and intelligence, and Kindness, in which women evaluated as more important in an ideal romantic partner higher than men. We also found some differences among adolescent preferences from different cities for Chastity, Emotional stability, Good humor, and Social status. We found main effect of both Sex and City but not interaction effect for Desire for children and marriage, Good financial prospects, and Physical attractiveness, in which men evaluated as more important only the latter. Finally, we found an interaction effect between Sex and City for Fidelity, which women considered more important in most cities. We suggest that the process of choice of mate among Brazilian adolescents corroborates patterns found for already adults around the world, especially in relation to sexual differences and similarities. We also suggest that cultural influences may contribute for the development of patterns of preference for romantic mate.

**Jovana Vukovic**, B. Jones, D. Feinberg, L. DeBruine, F. Smith, L. Welling & A. Little.

Variation in perceptions of physical dominance and trustworthiness predicts individual differences in the effect of relationship context on women's preferences for masculine pitch in men's voices.

Several studies have found that women tend to demonstrate stronger preferences for masculine men as short-term partners than as long-term partners, though there is considerable variation among women in the magnitude of this effect. One possible source of this variation is individual differences in the extent to which women perceive masculine men to possess antisocial traits that are less costly in short-term relationships than in long-term relationships. Consistent with this proposal, here we show that the extent to which women report stronger preferences for men with low (i.e., masculine) voice pitch as short-term partners than as long-term partners is associated with the extent to which they attribute physical dominance and low trustworthiness to these masculine voices. Thus, our findings suggest that variation in the extent to which women attribute negative personality characteristics to masculine men predicts individual differences in the magnitude of the effect of relationship context on women's masculinity preferences, highlighting the importance of perceived personality attributions for individual differences in women's judgments of men's vocal attractiveness and, potentially, their mate preferences.

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18.30-19.30: Late afternoon sessions 13 – 15

### **Session 13. Coalitional psychology 2. (Pasteur)**

**Leonardo Cosentino & Emma Otta.**

The good, the bad and the ugly: evidence of perceptual adaptive biases in coalitional detection mechanisms.

Impression formation is ubiquitous in human interactions. We organize the world using our first impressions. Categorizing a person as a cooperator or competitor substantially changes the way we will interact with them. The objective of this work was to investigate the influence of first impressions on encoding processes. The memory confusion protocol was used to assess encoding, evaluating how people use the features of others as a basis of social categorization. In this study, 569 participants, 280 males and 289 females (age:  $22.23 \pm 0.21$  years), were exposed to an experimental context of verbal antagonism between two male teams, both with two black and two white players. After a distraction task, they were asked to recall the author of all sentences said in the conversation. In Parallel, we also evaluated first impressions of the team's players through 80 independent judges (age:  $23.58 \pm 0.73$  years). The judges were asked to estimate a few attributes of each target individual (e.g. attractiveness, competitiveness, aggressiveness); and to choose one player who appeared to be the most salient among others players regarding one characteristic (e.g. the most trustworthy, strongest, wealthiest). The expected distribution for each player as the author of the sentences was equivalent. However, we observed some divergences from those expected values: some of the players were chosen more as the author of the sentences than the others, independent of correctness. Combining the results from the experimental task and the judges' evaluations, we verified that the player who was the most likely of the eight to be named as the phrase's author was rated most competitive, aggressive, angry and untruthful, and the player who was second most likely to be named was judged least attractive and competitive, but most trustworthy. Analyzing only the correct

attributions, 24.6% of the answers given by the participants, these two players were again chosen the most, but their position was inverted. The general results indicate that certain intrinsic characteristics of target individuals could bias perceptual and memory mechanisms. It is plausible that selection may have favored the capacity to track coalitional cues, especially of potential cooperators or competitors in competitive contexts. Jointly, these findings suggest a low-order information-processing mechanism related to coalitional psychology, and support adaptive design in the perceptual mechanisms that underline encoding information.

**Pat Barclay & S. Benard.**

Manipulation of perceived threats to preserve rank in cooperative groups.

Humans and other species show greater within-group cooperation and self-sacrifice when their groups face external threats such as hostile outgroups or natural disasters. Such “threat-dependent” cooperation – although adaptive – can be manipulated by others (especially dominants) to promote cooperation and suppress status competition. In several experiments, we tested this claim and the underlying mechanisms using a variant of cooperative group game. We show that humans pay to increase others’ perceptions of group threats, especially when holding high within-group status. This manipulation is performed by less cooperative people, and it cost-effectively elicits cooperation and maintains personal status. Status competition increases people’s tendency to manipulate apparent threats, and reduces the likelihood of groups surviving. We will also discuss the effects of the type of competition, type of status, and the extent to which people develop skepticism of “cries of wolf”. Conceptually, these studies have implications for the evolution of within- and between-group competition and cooperation. Methodologically, they add new dimensions to cooperative group games that allow them to analyze more complex group dynamics.

**Frans Roes.**

Female inheritance of permanent group membership.

Permanent groups (groups with no inherent limit on group longevity) presumably exist in several species because over generations members share important interests, like the collective occupation and defense of a territory, an early warning system against predators, baby-sitting for the young, or coordinated hunting. Considering the association between cooperation and degree of relatedness (Hamilton 1964), it seems to follow that a collective interest is more likely to be achieved when members show a higher degree of relatedness. I will argue that if membership is inherited by only one sex, and this is the female sex, this results in a higher degree of relatedness between group-members than when membership is inherited by both sexes, or by males instead of females. Hence the expectancy of female inheritance of membership. Indeed, in the overwhelming majority of species of insects, fish, birds and mammals living in permanent groups this is found. The (few) exceptions to the rule are discussed. Humans are of special interest because human pre-industrial societies tend to show either male or female inheritance. I will speculate that major differences with respect to the position of women are associated with these two systems of inheritance.

**Session 14. Studies of foragers. (*Antigone3*)**

**Coren Apicella, E. Azevedo, N. Christakis & J. Fowler.**

Isolated hunter-gatherers do not exhibit the endowment effect bias.

The endowment effect, the tendency of people to value an item they possess over an item they do not, is one of the most well known departures from rational choice. While this bias has survived replication in a number of settings, most experiments have been confined to university students from industrialized countries. We experimentally tested for the endowment effect in Hadza hunter-gatherers of Northern Tanzania. While we find that Hadza living in isolated regions do not display the endowment effect ( $p=.77$ ), Hadza living in a region frequently visited by ethno-tourists and who have contact with modern markets, do display the endowment effect ( $p<.0001$ ). These results suggest that the bias is associated with exposure to modern economies and not a human universal.

**Sasala Taiban.**

Change and continuity in indigenous hunting culture: a case study of the Kochapongan Rukai in Taiwan. This paper explores the transformation in Rukai traditional ecological knowledge and the hunting culture of Kochapongan (Haocha), an indigenous village located in southern Taiwan. The Rukai managed their local

resources through a strict resource use system that was followed by tribal members for many years. However, such mechanisms have gradually changed or disappeared due to village relocation and natural disasters, land nationalization policies, and the introduction of commercial hunting, as well as the practice of western conservation systems.

Changes in Kochapongan hunting practices and behavior have mainly been triggered by intervention from external forces. Prior to state interference a tribe was the largest political unit and the chieftain the most significant leader, playing a central role in the distribution of resources. The land nationalization policy and practice of agricultural-orientation during the Japanese colonial rule of Taiwan not only restricted the range of farmland and hunting grounds, but also had a direct impact on established aboriginal land system structures. The land measurement policy implemented in the 1960s started a trend of land privatization, establishing the concept of family property as well as changing the practice of claiming rights to hunting grounds and the custom of prey distribution, both notable elements of traditional Kochapongan hunting culture. Moreover, the implementation of conservation laws and regulations since 1980 has significantly limited the practice of traditional production activities such as hunting and gathering. Typhoon Morakot, which caused significant damage to Taiwan in 2009, prompted the most recent relocation of Kochapongan. This is yet another catalyst for change, as community members become further removed from their traditional territory.

A resulting casualty of the transformation in hunting culture is the significance of the lily. The lily is a sacred flower for the Rukai, symbolizing hunting prowess when given to male tribe members. However, with hunting no longer offering a path to honor, hunters are becoming more reluctant to bring out their prey to share with the rest of the village; the cultural symbolism of the lily is consequently declining as well.

**Kathryn Demps, F. Zorondo, C. Garcia & V. Reyes-Garcia.**

Honey hunting with the Jenu Kuruba: An exploration of the social and individual pressures on the transmission of local ecological knowledge.

In the face of great change in some areas of traditional knowledge among the Jenu Kuruba, we find that honey collecting remains fairly stable in this small-scale south Indian society. The behavior of "honey collecting" is a conglomeration of skills and knowledge acquired in different manners and independently affected by variation in individual ability and learning context. Sociological factors such as norms about independence, kinship and residence practices, gender roles and access to the forest also affect patterns of social learning. Through a combination of quantitative and qualitative data, we examine how individual and social factors intertwine to produce a gestalt in the stability or instability of socially acquired traditional knowledge. We find that economic motivation combined with flexible social learning contribute to a stable body of knowledge.

### **Session 15. Sexuality. (*Rondelet*)**

**Robert King & J. Belsky**

A typological approach to understanding functions of human female orgasm.

Building on previous work that identified different types of orgasm in human females (King, Belsky, Mah, & Binik, in press), the goal of the present study was to extend such typological work and determine whether female orgasmic variability tracked potentially evolutionarily salient sexual partner characteristics (e.g. those displaying possible immune-system compatibility). Two-hundred and sixty-five females completed an Internet survey about their orgasmic experiences-- achieved either with partners or alone. For partnered orgasms, they also provided details of partner characteristics and sexual behaviors. Latent class analysis revealed two orgasm types which were meaningfully distinguishable in terms of sensations and location—either centered on the surface of genitalia or deep inside. Deep orgasms were associated with internal sensations consistent with proposed functions of female orgasm in terms of differential sperm insuck. Such orgasms were associated with partners who were perceived as considerate, dominant, with a noticeably attractive smell, and as providing firm penetration. However, some hypothesized reproductively significant partner characteristics were not differentially associated with deep orgasms (i.e., muscularity, aggression, masculinity). Results are discussed and future research directions outlined.

### **Gerulf Rieger & R. Savin-Williams**

#### **Gaze Patterns Are A Strong and Objective Indicator of Human Sexual Orientation.**

Sexual orientation in humans is a biologically crucial behavior because it promotes mating and reproduction. Yet, most studies on human sexual orientation are based on self report, which can be unreliable for several reasons. In the present study we introduce a novel behavioral measure of sexual orientation: gaze patterns. We used an SR Research EyeLink 1000 infrared gaze tracker to assess gaze patterns in 325 heterosexual, bisexual, and homosexual men and women who were watching male and female stimuli (videos of naked and dressed men and women). Results indicate that the percentage of time looking at men versus women is a strong indicator of sexual orientation. Compared to previous results, this measure is a stronger indicator of sexual orientation than genital arousal patterns, and likely the strongest behavioral indicator of sexual orientation ever assessed. Pupil dilation and automatic eye movements (saccades) are also significant indicators of sexual orientation. These latter two results are particularly important since they derive from involuntary behaviors. Results apply to both men and women, but are stronger, in general, in men. Because gaze patterns are more objective, on average, than self-report data, and less invasive than other behavioral measures (e.g., measures of genital arousal) these results suggest a new methodology of assessing human sexual orientation which is free of previous limitations.

### **Lesley Newson**

#### **Does desire for grandchildren “evoke” anti-homosexual norms?**

Evolutionary explanations for homosexual behaviour have been suggested but less attention has been devoted to explaining attitudes to homosexual behaviour and why these attitudes are changing in many populations. A suggestion popular among laypeople and some social scientists is that religious teaching influences people to be anti-homosexual. Evolutionary theory provides an obvious reason why people should prefer sex with the opposite gender – it leads to offspring. But why should we care who other people choose to have sex with? Evolutionary theory suggests that we should only care about the reproductive success of our close relatives. If so, people should exhibit or experience different feelings about homosexuality when talking to their son than when talking to a non-relative. To detect this difference participants in an online study were primed by thinking about a son, friend or stranger asking a question about homosexuality. Over a thousand self-selected participants were given one of these primes and then presented with a series of questions about the advice they would give and their own beliefs about homosexuality. The difference observed was unexpected but supported the hypothesis. Participants randomly assigned to the “parent” condition who were parents themselves were twice as likely to abandon the study after exposure to the prime. Participants who completed the study were asked who they thought would be most disturbed if a young man “came out” as gay and given the response options: his friends/family/both/other. Over 50 percent chose “family” and one percent chose “friends”. Given a blank space in which to explain their choice, over a third of those choosing family mentioned parent’s disappointment at having no grandchildren. Only three percent mentioned religion. These results support an evolutionary explanation for why most populations have (or had) cultural norms proscribing homosexual behaviour. Prior to industrialization, most people spent most of their lives in communities in which interaction between kin was frequent. Such communities are likely to maintain norms which strongly discourage homosexuality in favour of reproductively successful relationships. In modern communities, in which the vast majority of social interactions are among non-kin, these norms are likely to relax. Acceptance of a new norm of tolerance of homosexuality is likely to take several generations to become widespread, however.

## FRIDAY, JULY 1<sup>st</sup>

9.00-10.00: Plenary 3

**Sam Bowles - Santa Fe Institute, USA & University of Siena, Italy.**

A cooperative species: evolutionary models & the Pleistocene human condition.

Drawing on my just-published book (with Herbert Gintis) I will provide an empirically based explanation of the emergence and proliferation of distinctly human forms of cooperation. There are many models of this process, all of which “work” from a mathematical standpoint; the question I will address is which ones provide a convincing account of the evolution of social behaviors under the conditions that humans experienced during the Late Pleistocene.

If (as both experiments and natural observations suggest) many humans are genuinely altruistic the puzzle is not the one addressed by many economic and biological models, namely why self regarding individuals would act as if they were unselfish when they really are not. Rather it is to explain how the species evolved so that a substantial fraction of its members would act altruistically, meaning that they undertake actions that confer benefits on others which if abandoned would raise their payoffs (either material or genetic).

The most plausible explanation is that humans (then, as now) occupied environments that made cooperation among substantial numbers of individuals essential to survival – in predation, risk pooling, defense. Because altruism was essential to cooperation in groups of significant size, groups with a preponderance of altruists exploited these gains to cooperation and did better in competition with other groups, enhancing the material payoffs and fitness of their members. Between-group competition favored not only altruistic individuals but also group-level institutions such as food sharing, information sharing, consensus decision making and other forms of reproductive leveling. Thus culturally transmitted institutions co-evolved with culturally and/or genetically transmitted individual behavioral predispositions.

The empirical plausibility of this interpretation is based on climatic, genetic, archaeological, ethnographic and other data. These show that genetic differences among ancestral groups were probably substantial and that environmentally induced crises and warfare were significant causes of mortality that tended to weed out less cooperative groups with few altruists. The same evidence raises serious doubts about an alternative explanation, namely that contemporary (genuinely or seemingly) altruistic behavior is common because our ancestors lived under conditions – closed communities of close family members – in which these behaviors were individual fitness enhancing, and we did not adjust our behavior as these conditions changed.

Bowles, Samuel and Herbert Gintis. 2011. *A cooperative species: human reciprocity and its evolution*. Princeton: Princeton University Press.

10.00-11.20: Morning sessions 16-18

### Session 16. Reciprocity. (*Antigone3*)

**Masanori Takezawa**

Memory-based indirect reciprocity: an experimental study.

Evolutionary game theoretical models revealed that the success of indirect reciprocity critically depends on how to evaluate reputation of individuals. Various strategies for assigning reputation to resource givers have been proposed. One major dimension characterizing the strategies is whether to use second-order information (i.e., reputation / behavior of past recipients of current recipients) and theoretical research found that evolutionarily stable strategies must use the second-order information, for instance, for discriminating justified from unjustified defection (Leimar & Hammerstein, 2001; Ohtsuki & Iwasa, 2004; 2006). In this study, we investigated whether people actually use the second order information for evaluating reputation of the others when people need to store the information of the others' past actions in their memory. Differently from the previous experimental studies on indirect reciprocity (Wedekind & Milinski, 2000; Milinski et al., 2001; Bolton et al., 2005; Mashima & Takahashi, 2008) where both the first and the second order information were explicitly given from the experimenter when evaluating the others, participants in the current study needed to recall the information of who helped whom from their memory when they evaluated the others' reputation. Two computer-based judgment experiments and one behavioral group experiment were conducted. All the three experiments

revealed that, although people seem to be able remember both the first and second order information, participants used only the first order information for making a decision whether to help the current recipient. In other words, participants exclusively used image-scoring strategy (Nowak & Sigmund, 1998) when evaluating the other players and none of the other strategies using the second-order information such as standing (Leimar & Hammerstein, 2001) or leading-eight (Ohtsuki & Iwasa, 2006) were employed by the participants. Implications of the experimental results will be discussed by considering assumptions of informational structure in major evolutionary game theoretical models.

**Przemyslaw Zywicki & S. Wacewicz**

Patterns of verbal conflict-resolution behaviours in 'economic' conversational exchanges.

While the evolution of language is frequently construed as either the evolution of 'narrow syntax' or a more comprehensive suite of cognitive capacities, a broader approach considers language as a special case of interaction between Darwinian agents aiming at the maximisation of their (inclusive) fitness. This perspective emphasises such issues as the evolutionary stability of honesty, the emergence of norms and policing, and the overt/covert social costs/benefits of communication, especially in-group status. In line with this last approach, we focus on conflict-resolution behaviour patterns in conversational exchanges, as we believe that they might reflect ancient normative mechanisms for the pre-emption and appeasement of aggression in emerging language-like communication; the role of such mechanisms is bolstered by the fact that the prototypical arrangement of agents in conversation (face-to-face, or squaring up, and physical proximity) is also the prototypical arrangement in agonistic encounters. A study was conducted focusing on verbal conflict-resolution behaviour patterns in conversational exchanges. Adjacency pairs – sequences of functionally related conversational turns, such as question-answer, greeting-greeting, etc. (e.g. Sacks 1992) – were treated as discourse games (e.g. Carlson 1984), with conversationalists performing the generic roles of the game initiator and game respondent. The examination of 74 games suggests that conversational exchanges exhibit a strong tendency towards conflict-avoidance and conflict-resolution. Specifically, the appearance of dispreferred, i.e. clash-holding, turns is followed by reparatory actions. Further analysis has led to distinguishing an important class of games, which serve to transfer goods or services between the initiator and respondent (economic games). The two basic variants of these games are determined by the direction of the economic transfer: in other-benefiting games, such as offers and invitations, the transfer is directed at the respondent; in self-benefiting games, such as requests and questions, the transfer proceeds towards the initiator of a game. We found that in economic games, the initiative to avert crisis created by a dispreferred move tends to be inverse to the expected direction of the economic transfer; i.e. in other-benefiting games, the repair is usually started by the initiator (e.g. by modifying the original offer), while in self-benefiting games, where the initiator is the intended beneficiary, it is the respondent who commonly inaugurates the repair (e.g. by suggesting an altered version of the request which she will be able/willing to grant). In our view, this indicates the inadequacy of the goal-orientated accounts of conversational interaction and points to its inherently normative dimension.

**Julian Lim, D. Sznycer, A. Delton, T. Robertson, L. Cosmides & J. Tooby**

The more you value me, the more I value you: welfare tradeoff ratios, emotions and reciprocity.

Other things being equal, the more benefits someone gives to you, the more valuable they are to you. A key determinant of the benefits likely to be given over the long term is that person's willingness to incur costs to give benefits to you – a psychological variable we call the Welfare Tradeoff Ratio (WTR). The WTR toward you expressed by others thus becomes a cue for calibrating your own WTR toward them, a reciprocal process that can lead to mirrored valuation. This process, we propose, is implemented by the emotion programs of gratitude and anger. We tested this model of reciprocity using a novel form of economic game, the WTR task. The WTR task consists of a set of decisions, each involving a choice between a sum of money for self and a sum of money for another. Unlike most standard economic games, which involve a fixed cost-benefit ratio (e.g. in a dictator game, every dollar more for the recipient is a dollar less for the dictator), the WTR task involves a range of cost-benefit ratios, allowing a more fine-grained and ecologically valid assay of personal valuation. Subjects were paired randomly, and each took turns making a series of 10 WTR decisions while their partner observed. Results showed that paired subjects tended to match each other's WTRs. Emotions played theoretically predicted roles: gratitude in response to higher WTR and anger in response to lower WTR. Being informed that the partner would have no chance to reciprocate (last round) did not lower subjects' altruistic decisions. Moreover, an individual's

behavioral and emotional responses to her treatment by her partner were far more strongly affected by the WTR her partner expressed toward her than by the amount of benefits she received. These findings support the hypothesis that the mind regulates cooperative behavior using cues of others' cooperative dispositions (WTRs) toward oneself.

### **Elsa Ermer**

Social decision-making about tradeoffs and reciprocity in psychopathy.

Psychopathy is a serious personality disorder characterized by a profound lack of morality and behavioral controls in the presence of intact general intellectual functioning. One hallmark of psychopathy is the continual failure to follow social norms governing reciprocity. Recent research suggests that reciprocity in normal humans is regulated, in part, by assessment and mirroring of welfare tradeoff ratios (WTR), that is, the willingness of an individual to tradeoff their welfare to benefit a specific other. Normal humans' social decision-making is sensitive to several factors, such as degree of relatedness and relationship history, that regulate the degree to which one organism should weight the benefits of another in a potential tradeoff. Recent evidence supports the idea that these factors are combined into a summary variable, termed a welfare tradeoff ratio, used to regulate reciprocity. These findings raise the question of whether psychopaths' persistent antisocial behaviors stem from a failure to form or update welfare tradeoff ratios regulating social decision-making. To begin to address this question, we tested incarcerated psychopaths' and non-psychopaths' tradeoff decisions across a range of tradeoff types and relationship targets. Estimates of psychopaths' welfare tradeoff ratios were indistinguishable from those of non-psychopaths. We then tested whether psychopaths show typical emotional responses and recalibration of WTRs in response to cues from repeated interactions in others. These studies suggest that psychopathy may stem, in part, from a failure to appropriately recalibrate regulatory variables in response to relevant social information.

### **Session 17. Correlates of individual differences in testosterone. (*Pasteur*)**

**Rebecca Sear, D.W. Lawson, A. Núñez-de la Mora, G. Cooper & S. Moore**

Does testosterone correlate with marital and parental status in a polygynous, high fertility population? A test in Gambian men.

In Western populations, testosterone (T) correlates with marital and paternal status: partnered men and men with children have lower testosterone than single, childless men. This is thought to reflect differences in mating and paternal effort, with lower testosterone mediating relatively greater parental effort. But marriage patterns and the role of fathers vary considerably cross-culturally. Patterns seen in the monogamous, low fertility West may not be replicated in other populations and, in fact, have not been replicated in at least some populations outside the West. Further analysis needs to be performed across a wide range of cultures in order to test whether T relates to marital and paternal status in different ecological and cultural settings. Here, we test whether T correlates with marital and paternal status in a polygynous, high fertility population in rural Gambia. Such populations allow us to extend this analysis, not just testing simple dichotomous relationships (partnered or not, father or not), but by testing whether T varies within categories of married men or fathers. We also test whether number or age of wives, or number or age of children matters, or whether the amount of time spent with wives or children is correlated with T. We collected salivary T data from 100 men between the ages of 18-70, as well as data on marital and paternal status, and potentially confounding factors such as anthropometric and socio-economic status. We show that, controlling for confounding factors, married men and single men do not differ in T, but that polygynously married men have higher T than monogamous men. We also show that fathers do not differ from non-fathers in T, but among fathers an indicator of paternal effort – time spent with children – does correlate with T: men who spend more time with their children have lower T. Our analysis partially supports the hypothesis that T reflects relative mating and parental effort, but highlights the importance of replicating human evolutionary research across a wide range of ecological settings.

**Aaron Blackwell, B. Trumble, C. von Rueden, J. Stieglitz, D. Cummings, M. Emory Thompson, J.J. Snodgrass, E. Fitzgerald, M. Gurven & H. Kaplan**

Don't bring your cough to the gun show: Testosterone, immunocompetence, strength and dominance in an Amazonian horticultural population.

The testosterone handicap hypothesis suggests that testosterone acts as an immunosuppressant and that expensive, testosterone-linked, dimorphic traits serve as advertisements of ability to afford immunosuppression. Many studies have supported aspects of this hypothesis, however most have been conducted in non-human animals and have generally only examined one aspect of immunity, such as antibody production or leukocyte count. Moreover, a life history perspective suggests that testosterone should be thought of as a mediator of strategic trade-offs in energy allocation, rather than strictly as an immunosuppressant. In the present study we examine testosterone, immunocompetence, physical strength and size, and social status in adult males from a forager-horticulturalist population, the Tsimane of Bolivia. Unlike past studies, multiple measures of immune function were obtained to assess trade-offs between types of immunity, including blood assays for levels of immunoglobulins (G and E) and flow cytometric analysis of lymphocyte populations to quantify B-cells, NK-cells, and CD4/CD8 T-cells. Androgen levels were measured in saliva (testosterone), urine (testosterone), and serum (dehydroepiandrosterone sulfate; DHEA-S). Strength was evaluated using portable dynamometers. Finally, peer rankings were used to assess multiple dimensions of status and prestige. Overall our results suggest that androgen and androgen-related traits are not associated with blanket immunosuppression, but rather with shifts in immunity away from humoral defenses toward more generic defenses. Height, strength, peer rankings of status, and hemoglobin were related to higher DHEA-S and higher measures of cell-mediated immunity, including higher NK-cell counts, but were associated with lower total leukocytes and lower markers of humoral immunity, including B-cell counts, and helper (CD4) T-cell counts. Testosterone levels were also associated with lower immunoglobulin levels, particularly IgG, and this relationship persisted controlling for body fat. These results are consistent with past studies showing reductions in antibodies and leukocytes in high-ranking individuals or with high testosterone. However, the observed increases in other defenses argue against a simple handicap interpretation and instead favor a life-history perspective.

#### **David Puts, C.L. Apicella & R.A. Cárdenas.**

Masculine voices signal men's threat potential in forager and industrial societies.

Humans and many nonhuman primates exhibit large sexual dimorphisms in vocalizations and vocal anatomy. In humans, same-sex competitors and potential mates attend to acoustic features of male vocalizations, but vocal masculinity especially increases perceptions of physical prowess. Yet the information content of male vocalizations remains obscure. We therefore examined relationships between sexually dimorphic acoustic properties and men's threat potential. We first introduce a new measure of the structure of vocal formant frequencies, "formant position" (Pf), which we show is more sexually dimorphic and more strongly related to height than is the most widely-used measure of formant structure, "formant dispersion", in both a US sample and a sample of Hadza foragers from Tanzania. We also show large sexual dimorphisms in mean fundamental frequency (F0) and the within-utterance standard deviation in F0 (F0-SD) in both samples. We then explore relationships between these acoustic parameters and men's body size, strength, testosterone, and physical aggressiveness. Each acoustic parameter was related to at least one measure of male threat potential. The most dimorphic parameters, F0 and Pf, were most strongly related to body size in both samples. In the US sample, F0 predicted testosterone levels, Pf predicted upper body strength, and F0-SD predicted physical aggressiveness.

#### **Carin Perilloux & D. Buss**

Testosterone and men's sexual misperception.

This experiment tested whether men's testosterone (T) levels influenced their tendency to misperceive women's sexual interest. Male participants ( $N = 58$ ) arrived at the lab and engaged in a (rigged) computer game against an unseen male competitor, in which participants experienced a "win" or a "loss." After the game, each participant engaged in a puzzle-building exercise with a trained female confederate posing as a participant. After the interaction, they rated her on multiple traits. The focal dependent variable of sexual misperception was calculated using a difference score--the discrepancy between each man's reported sexual interest in the woman and her reported sexual interest in him. Salivary assays for T were collected before the game, after the game, and after interacting with the confederate. The results of the experiment demonstrated that although the competition outcome did not affect men's T, changes in T during the game and during the interaction with the woman predicted men's sexual misperception. The more attractive the man found her, and the more he was interested in her, the more his T increased during their interaction. Indeed, the man's level of interest partially mediated the relationship between T and sexual misperception. Men oriented toward long-term mating showed

no relationship between T changes and overperception, whereas short-term oriented men exhibited a negative relationship between T change and misperception. The current study is the first to investigate and document the influence of endocrine factors on sexual misperception and thus opens the door for future studies to incorporate hormonal assays.

### **Session 18. Symposium: *Evolved visual mechanisms.* (Rondelet)**

#### **Russell Jackson.**

Human navigational adaptations.

Natural selection acting on cognitive algorithms likely promotes economy of processing such that the simplest and most efficient mechanism with the greatest benefits is likeliest to increase in frequency. Successful execution of navigational mechanisms precludes much, if not most, animal behavior. One of the broadest navigational algorithms likely used across species is also among the simplest with the greatest benefits: A preference for the nearer of otherwise equivalent navigational goals (PfN). This assumption underlies most recent work under Evolved Navigation Theory and many other experimental approaches investigated for several decades. Incredibly, no previous research has ever substantiated PfN in humans and only two pieces of circumstantial evidence may support PfN in other species. Researchers have assumed that the magnitude of PfN depends upon, 1) distance to the navigational goals and, 2) distance between navigational goals. However, data from two current experiments support only one of these assumptions. I tested PfN across a range of real-world distances. Human navigational decisions clearly supported one assumption of PfN, while they clearly contradicted the other. This information is crucial for identifying the cognitive adaptations underlying one of the potentially broadest selection pressures in mobile species. Previous predictions from Evolved Navigation Theory have suggested that, if humans exhibit PfN, then distance perception may adaptively reflect navigational risks present over evolutionary time. In effect, if we faced selection from reliable features in the environment, such as falling from cliffs, then we might overestimate the length of such surfaces because doing so would result in decreased navigation of the surface. In third and fourth experiments, I tested PfN in real-world perception of identical distances that contained different levels of evolutionarily relevant navigation risks. As predicted, evolutionarily relevant navigation risks appeared to shape distance perception prior to navigation in both common and novel environments. The coevolution of two adaptations or clusters of adaptations may have occurred in the evolution of human navigational mechanisms. One set of adaptations likely produced a preference for the (perceived) nearest of otherwise equivalent navigational goals. The other set of adaptations likely attuned distance perception to navigational risks present over evolutionary time. These studies help specify in ways previously unavailable the adaptive cognitive algorithms in navigation.

#### **Joshua New & E. Glaser**

Arresting perception: The ability of people and animals to implicitly capture attention also prolongs their subjectively experienced duration.

The increasing consideration of evolutionarily-relevant stimuli has reinvigorated the study of visual attention. Stimuli such as spiders, angry faces, and even animate objects categorically (humans and nonhuman animals) appears to be uniquely capable of capturing attention. Prioritizing the detection of such objects, though undoubtedly of great adaptive value, may be only the first advantage attention affords. We examined how attention may also augment their representation in visual awareness. Increased attention to, and information processing of, a stimulus might result in its experienced duration exceeding its veridical duration. This prolonged visual representation might be most advantageous (and demonstrable) for brief percepts, e.g. glimpsing an animal darting through foliage. We predicted that the duration of briefly-displayed people and animals (both previously shown to be prioritized for visual attention) will more often appear greater than their veridical duration than will inanimate objects. We tested this prediction with the 'oddball' paradigm: the duration of an attention-capturing stimulus in a sequence of images often appears longer than the other stimuli, even when displayed for less time than the 'standard' duration used for the rest of the sequence. One item from one natural category (people, animals, flowers, or vehicles) was presented in a series of urban and rural landscapes and ranged in duration from half to slight longer than the standard duration. Participants were asked simply to identify which item in each stream of images was displayed for a greater amount of time than the others. In two experiments, compared against a standard duration of 120 or 220 milliseconds, animate objects were selected as

'longer' more frequently than inanimate objects irrespective of their actual duration and far more frequently than chance. But this effect was not greater with the longer standard duration and proportionally longer target durations, suggesting that attention's prolongation of visual representations does not compound with increasing durations. We finally evaluated the mediating role of attentional engagement by embedding items from two categories in each sequence, either close together or further apart. Animate objects were again selected more often than inanimate objects as 'longer', whether presented first or second. The participants also demonstrated pronounced 'attentional blinks' wherein attentional capture by the first target image decreased the apparent duration of the second target image. This convergently supports the ability of attention to prolong (or contract) the apparent duration of brief visual events.

**Sandra Alvarado, R. Jackson & D. Calvillo**

Evolutionary relevance facilitates visual information processing.

One of the most fundamental human behaviors is that of conducting a visual search of the environment. Previous visual search investigations, however, generalize poorly to real-world human behavior. We suggested and tested the hypotheses that stimuli from evolutionarily relevant categories, would be processed more efficiently than evolutionarily novel categories and would mitigate the drastic inhibition that high perceptual load poses on visual search. The broad, directional selection pressures imposed on successful visual search likely narrowed this behavior to the most relevant stimuli targeted by visual searches over human evolutionary history. A significant component to evolutionary relevance of visual stimuli is that of animacy—the capacity for self-determined movement. Animate objects (such as humans and other animals) pose significant consequences to humans over evolutionary time and their self-determined movement makes their initial perception highly time sensitive. Consequently, we predicted that evolutionarily relevant and animate objects would provide a visual search advantage thus being located most efficiently and most proficiently mitigating the detrimental effects of high perceptual load. Data from 83 participants supported these predictions. Participants localized the evolutionarily relevant and animate condition most proficiently, followed by the evolutionarily relevant and inanimate condition, followed by the evolutionarily novel condition ( $F(2, 164) = 8.26, p < .001$ ). The present research suggests a perceptual system better attuned at localizing stimuli of persistent importance over evolutionary time.

**Chela Willey & R. Jackson**

Environmental falling risks and evolved horizontal distance perception.

Distance perception has likely coevolved with organisms' ability to navigate through its' environment. Navigational costs such as energy expenditure and falling risks likely have posed significant selection pressures on locomotor activity and distance perception. Likely due to an adaptive inclination to conserve caloric intake, humans and other mammals tend to prefer the nearer of two equivalent objects. Thus, an adaptive response to navigating surfaces that pose great risks may be to perceive those surfaces as longer than the actual distance. Research has shown a tendency for humans to overestimate vertical surfaces with visible falling risks while accurately estimating equivalent horizontal surfaces without such falling risks. However, humans in everyday travel more likely navigate horizontal surfaces that pose these falling risks than vertical surfaces. No prior research has examined the effect of falling risks on the perception of the horizontal surfaces. In four experiments, we investigated the perception of commonly navigated horizontal surfaces that pose falling risks. Participants in Experiment 1 estimated horizontal distances that lie upon surfaces that are commonly present in our contemporary, human-made environment. In contrast, participants in Experiment 2 estimated horizontal distances that lie upon naturally occurring falling risks that may have been present in our ancestral environment. Results from these studies suggest that humans tend to overestimate only horizontal surfaces that pose falling risks and do so ubiquitously across ancestral and modern environments. These results also suggest that increased exposure to the horizontal surfaces (i.e. the length of the horizontal distance) does not increase the magnitude of participants' overestimation when the falling risk remains constant. Experiments 3 and 4 investigate an array of commonly encountered horizontal surfaces situated around varying falling risks. Results from these studies suggest that participants consistently tended to overestimate the horizontal surfaces that posed falling risks and did so across a variety of commonly navigated surfaces. Additionally, results suggest that as the relative magnitude of the falling risks increase, the magnitude of the overestimation increases. These studies illuminate

perceptual mechanisms that may adaptively limit human exposure to navigational risks in the environment in which we have evolved.

## 11.40-13.00: Late morning sessions 19-21

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### **Session 19. Punishment. (*Rondelet*)**

**Karolina Sylwester, J. Mitchell & J.J. Bryson**

When and why do people “punish” cooperators: Individual strategies and regional variation in anti-social punishment.

The apparent discrepancy between Darwin’s natural selection theory and human cooperation towards unrelated individuals has given rise to numerous speculations and explanations. One expression of cooperation observed in the lab is that people will pay a fee in order to punish free-riders who generally as a consequence become more cooperative in future interactions. While the discovery of this altruistic punishment was not originally predicted by economists, it has since been embraced as an explanation for the uniqueness of human culture. However, more recently researchers accumulated evidence that some people will also pay a fee to “punish” cooperators. This anti-social punishment was originally seen as an unusual behaviour reserved for revenge against altruistic punishers. However, the motivation for anti-social punishment and its long-term consequences have not yet been well established. As a result different names for anti-social punishment exist in the literature such as negative reciprocity, spite, Schadenfreude and ultra-competitiveness. In a study of 16 comparable subject pools in different global regions, Herrmann et al. (2008) showed that the pervasiveness of anti-social punishment – and even of neutral punishment against individuals of a similar level of cooperativeness – varies widely across populations, and is sometimes as abundant as altruistic punishment. Even more interestingly, this variation does not seem arbitrary but rather appears to cluster geographically across global regions. Here we present new analyses of the Herrmann et al.’s dataset addressing the question of what drives anti-social punishment and contributes to its cross-cultural variation. Our analyses suggest that populations are composed of a variety of cooperative ‘types’ or personalities, and that different proportions of the types modulate the occurrence of costly punishment. We relate these results to a discussion of the socio-economic contexts in which anti-social punishment could be beneficial at the individual, group and cultural level. Herrmann, B., Thöni, C., & Gächter, S. (2008). Antisocial punishment across societies. *Science*, 319(5868), 1362.

**Sangin Kim, J. Tooby & L. Cosmides**

Burning down the house: Punishers just want to punish.

Instead of just acting to maximize their personal welfare, humans often choose to help, share, and act in the interest of others. At least some of these acts appear to be the result of incentives created by others, including punishment. For example, in public goods games, when the option to punish others is added, individuals who were previously less cooperative increase their levels of cooperation. The question is, then, why do punishers punish non-cooperators even when it is costly to do so? Many theorists start from the proposition that such punishers appear to benefit the group at personal cost. A number of theories have been advanced to explain how such “altruistic” punishment might have evolved in the human species, due this apparent group benefit, and despite the relative disadvantages punishers seem to have compared to non-punishers. Less well explored is the punishers’ proximate motivation. But it is not obvious whether the punishers’ proximate goal is harming non-cooperators per se, or helping the group. To what extent do punishers take group welfare into their decision-making calculus? Is punitive behavior based on a preference for increased group benefit or for harming the non-cooperator? We designed an experiment in which people face a trade-off between punishing non-cooperators at a cost to the group, or refraining from punishment. We found that a significant proportion of subjects choose the group-harming punishment. Moreover, punishers who contributed more (i.e., who were more altruistic) were more likely to harm the other cooperators to punish a non-cooperator. Indeed, when additional option is made available allowing players to reduce harm to the group but also reduce harm to the non-cooperator, surprisingly few people choose it. Thus, proximately at least, punitive behavior is driven more strongly by a taste for harming non-cooperators than by a taste for benefiting the group.

**Anne C. Pisor & D.M.T. Fessler**

Supernatural ire and human policing: is human norm enforcement more salient than supernatural? Researchers have demonstrated that supernatural beliefs in a given nation correlate with beliefs about moral transgressions, and that societies with supernatural punishment have more cooperation in some social domains. On the individual level, however, it remains unclear whether the threat of supernatural punishment is as salient as the threat of human punishment. To explore whether instances of supernatural norm enforcement and human norm enforcement are equally memorable in the U.S., we recruited volunteers from cities across the country through Craigslist.com (n = 263, female = 191). Participants were asked to recall the punishments for norm violations from a fabricated ethnographic text and to report their own punitive behavior via responses to a series of vignettes. We found that supernaturally-punished violations were more memorable to participants overall, with females having better recall for both human- and supernaturally-punished norms than males. Though it was expected that more punitive individuals might better remember punishments for norm violations (as these may represent opportunities to punish), highly punitive people did not better recall supernatural- or human-punished norms. Interestingly however, if other people were in the room when the survey was taken, older individuals were more likely to self-report punitive behavior than were other sub-samples of participants. Males were more punitive than females on average, while the distribution for females was skewed toward lower punitive sentiment. In line with error management theory, recall for extreme punishments (i.e., death) was also tested, but a small sample size made these data difficult to interpret. Differential performance by sex in recall, the predictors of punitive sentiment, and future directions will be discussed.

**Kari Britt Schroeder**

Sensitivity to punishment and normative behavior.

Punishment has been implicated in the stabilization of cooperation and other behavioral norms. Potentially large costs to fitness from punishment for norm violation may be observed in diverse societies and across domains. Hence, it has been suggested that humans have evolved psychological mechanisms for anticipating and avoiding punishment. Variation in these psychological mechanisms may explain some of the observed variation in adherence to cooperative and other behavioral norms within societies. We hypothesize that negative emotional lability may motivate individuals to avoid punishment. We use public goods games to investigate personality, mood, and depression as predictors of how closely individuals align their contributions with those of other group members. Deviation from the average contribution of other group members is a predictor of received punishment. Neuroticism, depression, and sex affect how closely individuals align their contributions with those of other group members.

**Session 20. Life history and reproductive scheduling. (*Pasteur*)****Venla Berg & M. Jokela**

Maternal emotional support in childhood predicts timing of first birth: Testing the evolutionary-developmental theory of attachment.

Life history theory suggests that individuals need to allocate their limited resources in a way that best promotes their reproductive fitness. A crucial point in this allocation is the timing of transition to parenthood. In humans, earlier timing of first birth has previously been linked to adverse childhood environments in many studies – the ultimate explanation being that higher mortality encourages faster life history strategies. Evolutionary-developmental theories suggest that one of the proximate mechanisms of this shift in reproductive timing is the quality of parent-child-relationship, or attachment, which would be informative of the availability and predictability of social and material resources, and mortality, i.e., the expected costs or benefits of delaying the onset of reproduction. However, studies with direct measures of parental behavior in childhood and data on later reproductive behavior are scarce. We assessed the hypothesis using longitudinal, prospective data from a nationally representative US sample (the NLSY79 Children and Young Adults; N=5854) in which parental behavior has been assessed with the observer-rated HOME inventory (short form, emotional support scale, average age at assessment 4.0 years) and the participants have been followed on average for 19 years up to age 15 to 36. We found that the quality of maternal emotional support was negatively associated with timing of first birth (standardized OR=.92, p<.01), even after controlling for several possible confounding factors. These results

support the evolutionary hypothesis of the importance of attachment relationship beyond childhood survival in biasing children towards faster or slower life histories later in life.

#### **Ilona Nenko & G. Jasienska**

First birth interval, an indicator of energetic status, is a predictor of reproductive strategy.

From a life history perspective, when resources are limited a negative relationship between reproduction and lifespan is expected in women. However, results of studies investigating costs of reproduction in terms of survival are inconsistent. Reasons for these discrepancies are complex, but nutritional status of a woman may play a crucial role. This study tests a hypothesis that women who have a good nutritional status early in reproductive life, as indicated by a shorter interval from marriage to first birth (first birth interval, FBI), would be able to afford more costly reproductive strategy than women who have a poor nutritional condition. We collected data on 677 women born between years 1759 and 1865 in a Polish rural, natural fertility population. Women with a short FBI (below median) in comparison to women with a long FBI (above median) had more children (7.1 and 6.5 respectively;  $F_{1,370} = 4.82, p = 0.029$ ), more sons (3.7 and 3.2 respectively;  $F_{1,370} = 5.85, p = 0.016$ ) and a shorter lifetime inter-birth interval (34.8 and 37.3 months, respectively;  $F_{1,360} = 4.34, p = 0.038$ ). Their higher lifetime fertility was achieved despite a later age of marriage (22.3 and 20.0 years, respectively;  $F_{1,370} = 31.30, p < 0.001$ ). Groups with short and long FBIs did not differ significantly in the age at first birth, number of daughters and the age at last birth. Further, women with a short FBI, despite having higher fertility, did not differ from women with a long FBI in their lifespan. Our results show, for the first time, that first birth interval can be used as a new method of assessing women's nutritional status in historical populations.

#### **Ian Rickard**

Insulin-like Growth Factor-I level at middle age covaries with life-history traits in contemporary British men and women.

The hormone Insulin-like Growth Factor (IGF)-I has a highly conserved role in mediating growth across a range of animal taxa, including nematodes, insects and vertebrates. Through this, and its association with reproductive activity and longevity, IGF-I may be of importance for our understanding of mechanisms of life-history variation. Studies of mammals suggest that individual circulating levels of IGF-I may underlie variation in reproductive performance. However, to date such relationships have been little explored in humans. Using data from a cohort of contemporary British men and women followed from birth, I studied the relationships between serum IGF-I measured at ages 45 and life history traits. IGF-I was lowest in both women and men who reported relatively late sexual maturity, but was positively associated with their age at first reproduction. In women, but not men, high IGF-I was associated with late age at last reproduction. There was a negative relationship between IGF-I and lifetime reproductive success in women but none in men. Neither reproductive lifespan nor reproductive rate was related to reproductive success in women or men. IGF-I tended to be higher in women who produced dizygotic twins than those who did not produce twins, but this did not reach statistical significance. Results for women were robust to adjustment for hormone replacement therapy, hysterectomy, oral contraceptive use, and recent cessation of menstruation. These findings add support to the hypothesis that dynamics of the IGF system is associated with reproductive traits in humans, but indicate that phenotypic relationships might be complex.

#### **Paula Sheppard & R. Sear.**

Sex differences in life history responses: are boys less susceptible to early life social conditions than girls?

Previous studies have shown that adverse early life conditions have consequences for later life history decisions. In general, factors indicating a sub-optimal developmental environment are associated with an accelerated life history strategy, at least in developed world populations. Nettle et al (2009, 2011) have shown that such factors were associated with earlier age at first birth as well as intentions for earlier age at reproduction for women in a large British cohort; the National Child Development Study. We tested whether a similar acceleration of life history events was seen among men from the same cohort under adverse early life conditions. Nettle et al (2011) showed that low paternal involvement, short period of breastfeeding, long separation from the mother before age seven and more than two household moves before age seven all predicted earlier age at first pregnancy in women, independently and additively. In contrast, for men, we found that only a short period of breastfeeding and low social class at birth were associated with younger age at first birth while other factors showed no

relationship and were also not consistent in the direction of the point estimates. We further found that early life conditions had no effect on intentions for earlier reproduction or for voice-breaking (a proxy for puberty) which is contrary to findings from numerous studies that find that poor early conditions are associated with younger age at menarche in girls. These results suggest that males may be less responsive to social factors indicating a sub-optimal childhood environment in relation to life history outcomes than are females. This contrasts with findings that males may be more susceptible to physiological stresses in childhood so we conclude that a life history approach should compare sex differences in reactions to both social and physiological disadvantages in early childhood and further explore how these are mediated.

### **Session 21. Willingness to care for children. (*Antigone3*)**

#### **Debra Judge.**

Child fosterage in rural Timor-Leste: pushes and pulls in child movement among households. Allomaternal care of children remains a focus of current interest in the evolution of human child rearing. Usually this refers to others in the child's environment providing care and resources in addition to those provided by the mother. In horticultural and agricultural systems, children may move among households (fostering) for short or prolonged periods. This movement of children also is a form of allocare but provides different care by others rather than care or provisioning additional to that of parents. In a study of 113 households in rural Timor-Leste including subsistence farming, trading, and professional families, 27% of 302 children identified with households were not living with biological parents. Between September, 2009 and May 2010, 19% of children at second contact had moved households – a high level of child mobility. We use growth data of children living with and away from biological parents and the characteristics of fostering-in and fostering-out households to determine the pushes and pulls for child transfer from one household to another and to address the question of who benefits from child transfers.

#### **Catiane Souza & M.E. Yamamoto**

##### **Do we prefer to take care of cute children?**

The physical characteristics of children's faces are attractive and are correlated with positive attributes, such as cuteness, kindness, affection and honesty, and may as well influence cognitive processes associated with parental care. The purpose of this study was to examine the relationship between physical characteristics of children's faces and the motivation for caretaking. Therefore, we asked adults to judge the cuteness of 60 printed photographs of different age range of male and female infant faces. Participants were asked to arrange the photos in descending order of cuteness, so as to insert in the first positions the cutest photographs and in the last positions the less cute photographs. Afterwards, we asked the subjects to answer questions about the willingness to take care of the children that they previously considered the cutest and the less cute on the photographs' rank position, such as "How willing do you feel to take care of this child?". After that, we compared the mean position of each photo with the baby schema features of the photographs, quantified in pixels. Based on these measures, we quantified the amount of pixels in this sample of infant faces: high measures would indicate a high baby schema and low measures a low baby schema. High values reflected positive values for face width and forehead length in relation to face length; negatives values for nose width and mouth width in relation to face width. We found a correlation between rank positions of photos and baby schema features' values, measured in pixels. So, the photographs inserted in the first and last positions were the same photographs indicated by measurements in pixels for respectively high baby schema and low baby schema. It was also verified that the high baby schema photographs elicited stronger expressed willingness for caretaking than the low baby schema photographs. Our findings suggest an effect of the baby schema on the perception of cuteness and motivation for caretaking in adults. These results indicated that the baby schema response is a critical function of human social cognition in a species whose young depend on care. We believe that such bias is probably evolutionary adaptive and enhance offspring survival through infant-caretaker interactions.

#### **Monique Leitão, R. Castelo-Branco, C. Dantas, F. Lopes & M.E. Yamamoto**

##### **Everybody loves babies: the effect of baby schema on children and adults.**

Babies are undoubtedly cute and this is attributed, mostly, to certain physical and behavioral characteristics. Their face, in particular, plays an important role to the adults' attraction for babies through a series of features

conceived as baby schema, which is comprised of traits such as big eyes, a round face and a large head. However few experiments have investigated the ontogenetic expression of this affection for babies. The aim of this study was to analyze empirically the effect of the baby schema features on cuteness perception in children and adults. A set of baby photos with different degrees of manipulated baby schema was exhibited to the subjects: high baby schema photo, original photo, low baby schema photo. The manipulated stimuli were: eyes, cheeks and head size. Participants were asked to point out the cutest baby and they had to explain their choices, specifying which traits have influenced their decisions. Results indicated that adults and children have perceived the high baby schema photos as the cutest ones. The subjects have mentioned physical characteristics more frequently than behavioral characteristics and other responses. Comparatively, adults have cited more physical characteristics and behavioral characteristics than children, who have pointed out other responses more frequently than adults. In relation to the physical characteristics, subjects cited infant-like traits more frequently than adult-like traits and neutral or non specified traits. The more mentioned traits were eyes, cheeks, fat, head and other features. Adults have pointed out the eyes more than children, and children have cited other features more than adults. Our findings suggest that there are many similarities in adults' and children's cuteness perception, especially regarding recognition of infant-like traits, although adults being able to identify these infantile features more clearly than children. According to the evolutionary theory, it is possible to consider that, even though the child's cognitive abilities are not mature yet, the development of caretaking mechanisms could already initiate during infancy, preparing the child to perform the caretaker role.

#### **Donald Cox**

Who does the baby look like? Relationship quality, perceived resemblance and paternal solicitude. What predicts a father's perceptions of a newborn's resemblance? Does his relationship with the birth mother matter? Are perceptions, in turn, correlated with his subsequent investments and care? There is abundant evidence that paternal investments matter for children, and emerging evidence that a father's willingness to invest could depend upon biological relatedness. An obvious indicator of relatedness, in turn, is physical resemblance. Despite the potential importance of these relationships, most of what we know about resemblance and fatherhood comes from narrowly focused studies with small samples. I use a large-scale, longitudinal household survey data set, the Fragile Families and Child Wellbeing Study, which contains questions about perceived resemblance and abundant information about parental investments and relationship quality for parents of children born out of wedlock. I find that fathers in closer relationships are more likely to say that the newborn resembles them. I also find that perceived resemblance is positively related to the establishment of legal paternity and financial transfers from the father's side of the family in the child's first year. Resemblance is in addition correlated with several measures of paternal investments and contact during the child's first year and toddlerhood, and it predicts paternal detachment. The fraction of fathers who chronically failed to provide support is twice as large among fathers who did not report a newborn's likeness to themselves than among those who did.

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#### **14.30-15.30: Early afternoon sessions 22-24**

##### **Session 22. Why get moralistic? (Rondelet)**

###### **Leda Cosmides & J. Tooby**

What can responses to attempted crimes tell us about human moral psychology?

There are a number of competing theories about the functions of the judgments and emotional responses that moral transgressions, crimes, and/or acts of illegitimate exploitation evoke in third parties. Yet, it remains a puzzle why people feel that attempts to carry out harmful acts, such as attempted murder, should be punished much less severely than successfully carried out inflictions of harm. If someone attempts to shoot a person in the head, and misses, why is he rewarded with a greatly reduced sentence? What is the logic of rewarding him for his incompetence, compared to someone who makes the shot? The legal and moral distinction between attempted harms and successful harms recurs across cultures and legal systems, with this distinction leading to greatly different penalties, and whether the act is even considered a crime worthy of punishment. We evaluate alternative proximate theories of moral architectures (e.g., designs that respond to intentions; designs that

respond to consequences), and evaluate alternative theories of ultimate function to see what can be concluded from this distinction about the evolutionary foundations of moral psychology.

### **Michael Bang Petersen**

Moralization as a strategy of last resort: Lack of social support predicts moralization of private goods. An evolutionary dissection of the costs and benefits involved in tagging behavior as ‘immoral’ is used to predict that individuals without social support are more inclined to perceive behavior as morally problematic. Hence, ancestrally, an individual’s ability to directly enforce his or hers interest against the interests of others would depend on his or her number of close allies. Without allies, an individual would have to rely on other more manipulative strategies to constrain the behavior of potential exploiters. Moralization – tagging actions as immoral – could be one such strategy whereby an individual attempts to mobilize the attention of others against exploitative acts. The prediction is tested using a large comparative dataset. The prediction receives strong support across both Western and non-Western countries. The theoretical accounts is further supported by the use of panel survey on moralization and social support in Denmark, which demonstrates that lack of social support has a causal effect on moralization. The analyses, however, also demonstrate that the predicted effects only hold among those who are not affiliated with groups directly organized around moral rules. Hence, for those who belong to religious groups, those with and without social support are nearly equal in their degree of moralization.

### **Florian van Leeuwen & J.H. Park**

Social categorization on the basis of moral character.

Studies of social categorization have shown that humans have a tendency to automatically categorize others along dimensions of sex, age, kinship, and coalition. From a functional perspective, it was predicted that humans—being a highly social species—should also categorize others according to moral character. Engaging in social interactions with moral as opposed to immoral others may have conferred fitness benefits, as immoral people may, e.g., pose a physical threat (violating morals of harm) or fail to reciprocate (violating morals of fairness). In four studies ( $N = 133$ ) using the memory confusion paradigm, participants were presented with male and female targets with neutral facial expressions, randomly matched with sentences ostensibly spoken by the targets. These sentences indicated either violation or endorsement of morals of harm (Study 1) or fairness (Studies 2 and 3) or distinct kinds of harm or fairness (Study 4), and thus allowed inferences regarding the moral character of the targets. In a memory test, participants indicated which targets had said which sentences. The pattern of recall errors are indicative of the categorizations made by the participants: Categorization yields more within-category than between-category errors (e.g., if one categorizes along sex, one is more likely to confuse a man with another man, than to confuse a man with a woman). Results of Studies 1, 2, and 3, showed that in addition to categorizing according to sex, participants spontaneously categorized according to moral character. Study 4 showed specifically that targets were categorized on a broader dimension of morality, rather than along more specific dimensions pertaining to harm or fairness. In addition, Study 4 included explicit ratings of the targets' perceived character, which showed that the moral and immoral targets were also explicitly perceived as differing especially strongly on the dimension of morality, relative to dimensions of competence, threat, and attractiveness. The entire set of results suggests that morality is a fundamental category, as the findings cannot easily be explained by more specific processes such as cheater detection (which cannot account for the results of Study 3 that showed categorization of targets that opposed or endorsed racism) or a negativity bias (which predicts better recall—i.e., fewer errors—for those with negative traits). Furthermore, the effects for categorizing according to morality (average  $r = .84$ ) were larger than those for sex (average  $r = .70$ ), suggesting that for social categorization, morality may be even more fundamental than sex.

### **Session 23. Facial symmetry. (*Antigone3*)**

**David Lawson, N. Pound, I. Penton-Voak, A. Toma & S. Richmond.**

Childhood health and facial symmetry in contemporary British teenagers.

There is abundant evidence that facial symmetry is positively associated with attractiveness, both since bilateral symmetry itself is attractive and because it may also be associated with other desirable traits. It has been suggested that the ultimate explanation for this association is that symmetry is an important correlate of phenotypic quality in potential mates, particularly in relation to physical health and the ability to resist

environmental perturbations early in ontogeny. This developmental stability hypothesis has gained considerable popularity in evolutionary psychology, but evidence of associations between asymmetry and developmental stress / poor health is limited. In part this is because few studies have provided appropriate measures of both facial symmetry and reliable assessments of health. In this study, we use uniquely detailed data collected by the Avon Longitudinal Study of Parents and Children (ALSPAC) to test whether or not facial symmetry in a large sample of British teenagers is predicted by markers of developmental stress during development. Using morphometric techniques, facial symmetry was measured from three-dimensional laser scans of 4000 individuals aged 15 years. Health was assessed throughout childhood using a range of measures including birth characteristics, direct measurements of physical growth, yearly reported incidence of specific infections and symptoms, and subjective assessments of general health. We also considered associations between facial symmetry, family socioeconomic status and performance on childhood cognitive tests. Facial symmetry was generally not predictive of good health across the measures considered. However, we do find slightly lower asymmetry in children from the wealthiest families and in children with relatively high IQ, suggesting that trace associations with some aspects of phenotypic quality may be present. We consider the implications of our results for future research into the role of symmetry in human mate choice.

**Christopher Watkins, B. Jones, A. Little, L. DeBruine & D. Feinberg.**

Cues to the sex ratio of the local population influence women's preferences for facial symmetry. In non-human species, increasing the proportion of potential mates in the local population often increases preferences for high quality mates, while increasing the proportion of potential competitors for mates intensifies within-sex competition. Here we tested for analogous effects in humans when we manipulated pictorial cues to the sex ratio of the local population and assessed women's preferences for symmetry, an established cue of mate quality in humans, in men's and women's faces. Viewing a competitor-biased slideshow (i.e., a slideshow of images in which women, rather than men, were in the majority) increased women's preferences for symmetry in potential competitors to a greater extent than did viewing a mate-biased slideshow (i.e., a slideshow of images in which men, rather than women, were in the majority). This suggests that women pay greater attention to the quality of potential competitors when competition for mates appears to be relatively intense. Although viewing a mate-biased slideshow tended to increase women's preferences for symmetry in potential mates to a greater extent than did viewing a competitor-biased slideshow, this effect was not significant. These data reveal facultative responses to cues of the sex ratio of the local population that appear to function primarily to promote successful within-sex competition.

**Larissa Vingilis-Jaremko, D. Maurer & D. Shen**

The attractiveness of facial symmetry: a comparison of adults and 9-year-olds.

Adults judge more symmetric faces to be more attractive than less symmetric faces (e.g., Rhodes et al., 1998; Perrett, 1999). We are examining developmental changes in the influence of symmetry on judgments of attractiveness by showing adults and children pairs of individual faces, in which one face was transformed 75% toward perfect symmetry, while the other face was transformed by exaggerating its asymmetries by 75%. In separate blocks of 16 trials, participants judged pairs of faces of women, men, 8-year-old girls, 8-year-old boys, 5-year-old girls, and 5-year-olds boys, and indicated which face in each pair they found more attractive.

Adults ( $n = 24$ ) rated the more symmetric faces as more attractive than the less symmetric faces for all six types of face ( $M$  choice of more symmetric  $> .76$  for all face types; all  $p < .001$ ).

Nine-year-olds tested to date ( $n=21$ ) rated the more symmetric faces as more attractive than the less symmetric corresponding faces (all  $p < .002$ ). The strength of child preferences, however, was significantly weaker than that of adults ( $M$  choice of more symmetric  $> .56$ ; main effect of age,  $p < .001$ ).

For every age of face, both adults and children had a stronger preference for symmetry in male faces than in female faces (main effect of gender of face,  $p=.001$ ). Adults and children also had an and showed an increasing preference for symmetry with increasing age of face (main effect of age of face,  $p<.001$ ). These effects could have arisen, because among the original faces, the adult and male faces tended to be more asymmetric than the child and female faces, respectively, as judged by an independent group of adults ( $n=12$ ). The greater asymmetry in the male faces is consistent with previous findings of more fluctuating asymmetry in the faces of boys than of girls (Melnik, 1992).

The results indicate that the influence of symmetry on attractiveness judgments is stronger for adults than 9-year-olds and stronger when viewing the faces of adults rather than children. The stronger effects for adult viewers may reflect an increase in sensitivity to symmetry as experience with faces increases and/or as the visual system matures. As well, attractiveness may become more salient after puberty such that honest signals of mate quality, such as symmetry (Wade, 2010), have a stronger effect for adult viewers and when judging adult faces.

#### **Session 24. Siblings. (Pasteur)**

**Aïda Nitsch & V. Lummaa**

**Are elder siblings helpers or competitors?**

Determining the fitness consequences of sibling interactions is pivotal for understanding the evolution of family living in species with altricial young, such as humans. Theory suggests that competition vs. cooperation with other siblings are the two types of interactions that could lead to maximization of individual fitness, and both may depend on several factors such as family size, birth order and sex of individual. Although these two types of interactions imply opposite effects on fitness of other siblings, studies investigating both hypotheses simultaneously over the whole lifespan of individuals and using long-term fitness measures are lacking. We used a large ( $n=20,000$ ) demographic dataset from preindustrial Finland to study both the positive and negative effects of elder siblings on the life-history traits of younger siblings across different ages, including: survival during childhood and different indicators of lifetime reproductive success (probability of reproducing, number of children and proportion of children raised to adulthood). We found a negative effect of the overall size of the family on survival of all siblings during childhood but no effect on reproductive success. Still, the presence of both elder sisters improved the relative survival of their younger siblings during childhood. However, for both men and women in adulthood, having same-sex elder siblings was associated with reduced reproductive success. Our results suggest that despite a global competition for resources during childhood, elder siblings may cooperate with their younger siblings during this period. Our results also indicate competition among same-sex siblings for resources such as mating opportunities once individuals have reached sexual maturity. This study is one of the first showing that individuals could have opposing effects on the success of their younger siblings depending on their life-history stage, and highlight the need for using long-term measures of fitness before concluding on the selection pressures on sibling interactions.

**Lucie Clech & Mhairi Gibson**

**Social network strategies of later borne offspring: a reaction to resource biases among siblings?**

This study explores intrafamilial variation in social network size and quality in contemporary Ethiopian rural and urban populations. Previous studies indicate a primogeniture bias in parental investment: first born males receive higher levels of education and inherit more land than later borne males. Here we explore the extent to which later borne offspring offset these parental biases through extensive social networks of helpful extended kin and nonkin. Anthropological, demographic, economic and social network data were collected from two samples in 2009. The first (rural) sample included 590 households from two agricultural villages in Ethiopia, and the second (urban) sample included a further 500 students attending a university in the regional capital city. Data concerning agricultural, domestic and economic helpers, network size and composition, reciprocity and altruism, and mobile phone contacts were collected. Multivariate, logistic and general linear model, using SPSS software, were used to analyze the effect of birth order, family configuration and parental investment biases on social network composition and size. In villages, birth order and family configuration have an impact on network size and composition, and patterns of altruism and reciprocity. Male later borne have more helpers than males first borne; middle boys benefit from kin help and last borne benefit from non kin help. Help provided by siblings varies according to sex. Data from the urban sample, concerning university students and their families, are under analysis. Patterns may differ, as family size and influence may vary between rural to urban areas. These data will allow a comparison between rural and urban populations. Social network size and composition, altruism and reciprocity strategies may offset resources biases due to parental investment. In comparison with firstborn, who receive more parental investment, later borne extend their support networks to siblings, more distant relatives, and also to non kin to obtain important resources.

**Sigal Tifferet, H. Efrati & A. Bar**

Predicting sibling investment by perceived sibling resemblance.

Sibling relationships have a longer duration than most other relationships, but in comparison to other family relationships they have not been studied much, especially not in adults. Siblings share 50% of their genes on average, ranging from 0% to 100%. Inclusive fitness theory suggests that kin investment is related to the level of genetic similarity. Physical similarity and character similarity can serve as proxies signifying the level of relatedness. We therefore hypothesized that the level of perceived similarity between siblings will predict the investment of the older sibling in the younger one. Eighty students (mean age = 25.2, SD = 0.5) from a large college in Israel filled questionnaires regarding their younger biological sibling closest to them in age. All participants had more than one sibling. Study results showed that sibling resemblance was positively correlated with investment in general ( $r(78) = .38, p < .001$ ), and with its components: emotional investment ( $r(78) = .35, p = .002$ ), time investment ( $r(78) = .40, p < .001$ ), and money investment ( $r(78) = .27, p = .02$ ). A multiple regression analysis with participant sex, sibling sex, age difference, family income, number of siblings, and resemblance as predictors explained 24% of the population variance in investment,  $F(6, 72) = 5.20, p < .001$ , with sex (being female), and resemblance positively associated with investment. Resemblance was also related to unconditional sibling altruism (donating a kidney and rescuing from a fire)  $rpb(78) = .19, p$  (one tailed) = .04. While resemblance in appearance was the major factor for predicting investment in females, resemblance in character was the major factor for predicting investment in males. Results support the hypothesis that perceived similarity with a younger sibling predicts investment and provides further support for the genetic similarity theory.

15.30-16.50: Afternoon sessions 25-27

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**Session 25. Cooperation. (*Antigone3*)****Teofilo Reyes & J. Mateo**

The evolution of allocooperation: Can nepotistic affiliative behavior act as a proximate mechanism for cooperation towards unfamiliar conspecifics?

Allocooperation, cooperation towards unrelated conspecifics, is a cornerstone of hominid society yet puzzles evolutionary biologists due to the adaptive benefits of cheating. The neurohypophyseal system, oxytocin (OT), arginine vasopressin (AVP), and related receptors, is causally associated with pair bonding and infant care in muroid models, providing one potential mechanism. Although exogenous OT appears to increase generosity and trust in humans, there is little evidence that endogenous OT or AVP release have an effect on allocooperative behavior. Pair-bonded fathers were tested in two groups that either played with their infants or read alone prior to a dictator game. Pre and post blood measures were taken to measure changes in peripheral endocrine levels. Play with an infant increased OT and decreased testosterone and cortisol, with no effect on AVP. Fathers who played with their infants made higher dictator gift allocations than fathers who read alone, replicating findings with exogenously administered OT. OT release predicted the size of the dictator gift, and receipt of a gift led to OT release only after play with an infant suggesting an oxytocinergic feedback loop encouraging reciprocal cooperation. Self-reports of allocooperation, measured through an expanded Self-Report Altruism Scale, were positively associated with OT reactivity and negatively associated with cortisol and testosterone. AVP reactivity was associated with the Multidimensional Emotional Empathy Scale. These findings suggest the neurohypophyseal system exerts a halo effect that radiates from the expression of nepotistic affiliative behaviors, acting as a proximate mechanism for the expression of allocooperation in humans and providing a compelling explanation for how allocooperation could have arisen despite the relative benefits of cheating. A simple social interaction led to measurable changes in endogenous endocrine levels with a measurable effect on allocooperative behavior.

**Daniel Nettle & A. Colleony**

Variation in cooperative behaviour across two neighbourhoods of the same city.

Amongst the most exciting discoveries in human cooperation research in the last few years has been how much variation across cultures there is in people's response to cooperative dilemmas. However, there is no need to travel so far to find variability in cooperation. Here, I report preliminary results of a multi-method study of cooperation comparing two neighbourhoods of the same city, Newcastle upon Tyne. These neighbourhoods are

only 6km apart, and have similar population density and ethnic composition. Presenting data from a household survey, direct behavioural observation in the streets, field experiments, and a bespoke experimental economic game, I show that the neighbourhood differences in cooperative behaviour within this city are as large as many of those that have been reported between distant populations. Implications for the behavioural ecology and evolutionary psychology of cooperation will be discussed.

**Shakti Lamba & Ruth Mace.**

Variation in cooperation across human populations: evidence from the ultimatum game.

The ultimatum game (UG) is one of the most extensively employed experimental economic games used to measure cooperative behaviour in humans. Several studies have demonstrated variation in UG behaviour across populations of small-scale and large-scale societies; this variation is currently attributed to cultural differences between populations. However, these studies have sampled from one (or few) populations per culture. Thus, they confound cultural and environmental differences between populations. An alternative explanation for the observed variation is that it reflects responses to different ecologies. We test the hypothesis that variation between populations is driven by differences in demography and local ecology rather than culture.

Using a one-shot, anonymous UG we demonstrate significant variation in proposer's offers across 21 discrete populations of the *same* small-scale society, the Pahari Korwa of central India. This within-culture variation is comparable to that found previously across 15 *different* small-scale societies. Our findings suggest that behavioural variation in proposer's offers currently attributed to cultural differences between populations may in fact be driven by environmental differences between them. In contrast, responders' behaviour varies little across the same 21 populations. These data add to growing evidence that proposer and responder behaviour in the UG does not always co-vary. Proposer and responder strategies in a bargaining situation may be affected by different drivers of variation and selection pressures.

**Carolyn DeClerck, C. Boone & G. Emonds**

Cognitive demands may impose evolutionary constraints on cooperation in social dilemmas. An fMRI study.

While examples of mutualism abound in nature, cooperation when there is also a strong incentive to free-ride is much less common and may have been constrained in evolution by the high demand for complex reasoning skills. To gain insights into the extent of the cognitive demands that accompany the wide range of cooperative behaviors, we compared decision making in two types of cooperation games under fMRI: a prisoner's dilemma (PD) eliciting a temptation to free-ride, leading to a dominant, self-interest response, and a stag hunt (SH) which has no dominant response but offers pay-off incentives that simulate mutualism and make cooperation collectively beneficial but risky. Consistent with higher demands for computational reasoning, the PD is associated with increased activation in frontal and parietal brain regions underlying deliberation to derive the single optimal solution. Additionally, greater dorsal anterior cingulate cortex (ACC) and dorsolateral prefrontal cortex (DLPFC) activation in the PD are consistent with the need to resolve the conflict between self and collective interest elicited by the mixed motives in the dilemma. When conflict is diminished in the SH, cognitive demands are relaxed and cooperation occurs more readily. We further investigated if individual differences in human cooperative behavior are also associated with underlying differences in neural activation patterns. People vary in their propensity to behave selfishly and strategically, which is reflected in the way they adjust their behavior to different incentives. Pay-off dominant individuals who adjust their behavior between games show more activation in frontal lobe regions (superior frontal gyrus and dorsal ACC), while participants who are not pay-off sensitive but consistently cooperate or defect show more activation in the lateral orbitofrontal, temporo-parietal and limbic regions. This suggests that (un)cooperative decision making in the latter group occurs more on the basis of intuition and norm compliance, while strategically adapting cooperative behavior according to incentives in the former requires frontal lobe driven deliberation.

## **Session 26. Information in the face. (*Pasteur*)**

**Isabel Scott**, A. Clark, L. Boothroyd & I. Penton-Voak

Is facial masculinity a sexual signal of immunocompetence?

The immunocompetence hypothesis of facial masculinity proposes that masculine facial morphology is a sexual signal of heritable resistance to infectious diseases. This proposal has received a great deal of research attention and is increasingly treated as plausible and well supported. In this talk, we outline some reasons to remain cautious about such a hypothesis. These include 1) the tentative nature of the evidence regarding masculinity and disease in humans, 2) the complex and uncertain picture emerging from the animal literature on sexual ornaments and immunity, 3) theoretical models indicating that cues of immunocompetence may not always be useful to females, 4) the absence of a clear overall preference, among women, for masculinised stimuli, 5) the unreliability of contextual influences, such as menstrual cycle shifts, on responses to masculinised stimuli, 6) contradictory findings from cross-cultural research, 7) the plausibility of alternative explanations for observed responses to stimuli, and 8) recent findings which indicate that masculinity contributes very little, if anything, to men's overall attractiveness. In response to these concerns, we propose some directions for future research on attractiveness and mate choice.

**Austen Krill, Kristen Rae Wyre**, K. Wathne, T.M. Lake, W. McKibbin, T.K. Shackelford & S.M. Platek

Detection of aggression and sexual aggression by facial characteristics.

Low quality males of many species, including humans, may resort to forcible copulation as a means of gaining sexual access to females. In two experiments we investigated the degree to which faces of incarcerated sexual offenders could be differentiated from faces of incarcerated non-sex offenders, incarcerated white collar offenders, and non-incarcerated matched control faces. In Experiment 1, we asked 131 participants to rate sex offenders (SO), non-sex offenders (NSO), and non-incarcerated control (NI) facial composites on attractiveness and sexiness, and to rate whether the person depicted appeared frightening or sexually coercive. SO and NSO faces were rated as less attractive and sexy than NI faces, but did not differ from each other on those dimensions. However, SO faces were rated as more frightening and sexually coercive than NSO faces. In Experiment 2, faces of criminals representing white collar crimes (WC), non-sexual violent crimes (NSV), and sexual assault crimes (SA) were ranked by 581 participants for detectable cues relating to their criminal acts and personality characteristics (e.g., trustworthiness, frightening, and sexually aggressive). Overwhelmingly, participants chose WC faces as more trustworthy, while NSV and SA faces were rated lower on trustworthiness. Similarly, SA faces were rated as more aggressive and more sexually aggressive than NSV and WC faces. Facial symmetry and masculinity did not differ between the face composites, suggesting that there are detectable cues not related to facial asymmetry or masculinity indicating a proclivity towards sexual offense.

**Achim Schützwohl**

Detecting men's and women's proneness to infidelity from facial cues.

From an evolutionary psychological perspective it is extremely important that one's long-term partner remains faithful. Accordingly, it would be advantageous if we would be able to detect whether a member of the opposite sex tends to be unfaithful when selecting a long-term partner. Three studies tested the hypothesis that men and women are sensitive to facial cues signaling the proneness of members of the opposite sex to infidelity. In two studies men judged pictures showing the faces of Caucasian women who admittedly had been unfaithful in the past or who had never been unfaithful with respect to their (a) attractiveness, (b) masculinity/femininity, and (c) proneness to emotional and sexual infidelity. In the third study, women judged pictures showing the faces of men who admittedly had been unfaithful in the past or who had never been unfaithful. The pictures were shown for only one second. The results of the three studies confirmed the prediction. Importantly, black and white men's judgment of the Caucasian women's attractiveness and femininity did not differ. However, only the white men were able to differentiate between the faithful and unfaithful women.

**Brian R. Spisak**, A.C. Homan, A. Grabo & M. van Vugt

Leadership is in the eye of the follower: testing a biosocial contingency model of leadership in intergroup relations using masculine and feminine faces.

Using an evolutionary psychology framework we propose that leadership and followership are evolved traits to solve recurrent group coordination problems. We argue that adaptive problems such as those concerning

intergroup conflict or cooperation activate different cognitive leadership prototypes, and the face conveys diagnostic information about the suitability and emergence of intergroup leadership. Building on this theoretical foundation we introduce a biosocial contingency model of leadership that incorporates followership perception of the environment, characteristics of the leader, and the leaders message. Consistent with hypotheses, in study 1, participants ( $N = 41$ ) prefer masculinized faces encouraging a competitive course of action against another group and feminized faces with cooperative intergroup intentions. In study 2, using an intergroup prisoner's dilemma, we find that participants ( $N = 108$ ) expect masculine-faced leaders to behave competitively and feminine-faced leaders cooperatively in intergroup relations. Furthermore, individuals prefer leaders whose facial cues match the prevailing adaptive problem. For example, a masculine-looking leader is preferred in a competitive intergroup prime. Also, this match between face and situation is reinforced with a consistent leadership message such as a masculine-looking leader expressing the need for competition (i.e. defection). From an evolutionary perspective, this research creates synthesis between traditional models and theories of leadership (such as contingency models and leadership categorization) with a biological understanding of innate human behavior and generates many novel hypotheses about how markers such as the human face affects leadership emergence and effectiveness.

## **Session 27. Cultural phenomena. (*Rondelet*)**

### **John O. Beahrs**

An infrastructure for human culture.

Cultural evolution influences and often outpaces genetic evolution, but research is impeded by our not yet knowing its underlying structure. "Memes" appear self-evident, but continue to elude precise definition. What is the cultural analogue of DNA? Culture and "minds" co-vary, but minds are anomalous. Whatever is or isn't "conscious" can reverse through social interactions. Beliefs' power varies with social factors more than truth. Legal accountability requires an "illusion of conscious will." Parochial functions of language are underattended. People judge one another by post hoc dispositional attributions, more than demonstrable social influences. Despite natural selection for cheater-detection, most humans detect others' lies barely above chance. Human beings appear to collaborate with one another in their own deceptions. A "shared self-deception hypothesis" (SSDH) accounts for these anomalies, and specifies culture's infrastructure – the missing DNA analogue. It presumes ancestral in-groups organized by indirect reciprocity, lethal inter-group warfare, information control, and punishment of self-serving deviance. Under such constraints, pair-bonding and tactical deception can link together to create a novel mode of shared self-advancement. Interactants covertly (1) grant one another wiggle room for self-interest beyond group norms, (2) conceal this process by shared self-deception, and (3) enforce this covert contract by the fact that if one betrays another to in-group punishment, he or she will be betrayed in return. This threefold process binds the parties into an emergent interactional structure – "covert contracting for autonomy and privacy" (C-CAP). C-CAP's serve as foundational units upon which complex culture builds and evolves. C-CAP-like phenomena are prevalent today. The SSDH postdicts the anomalies and precursors noted, and concords with evidence for pair bonding, indirect reciprocity, tactical deception, and whistleblower retribution. Computer simulations can test what parameters will give C-CAP's structural stability, then test these parameters against naturalistic data. The interface between the SSDH and other processes is also testable. The SSDH can help to clarify elusive psycho-cultural phenomena, such as group formation and dissolution, adaptive functions of irrationality, and conflict mitigation. Cultural entities emerge as interactional, multi-level, socially context-dependent, and modifiable through reframing. Associated belief systems can be studied by assessing their behavior effects, thereby opening new territory for science.

### **Thomas Currie**

The evolution of ethnic diversity.

Humans divide themselves up into groups based on the belief in a shared cultural identity and common descent. Culturally inherited differences in dress, language, and institutions are often used as symbolic markers of the boundaries of these ethnic groups. Relatively little is known about the function of ethnic groups, and why ethnic diversity is high in some regions yet lower in others. Examining the spatial distribution of such groups can reveal the factors that affect the origin and maintenance of human ethnic group diversity. Here I describe the use of a Geographic Information System to construct a large database that integrates information about ethnolinguistic

groups with a number of environmental, ecological, and ethnographic variables. I also compare the present day distribution of ethnolinguistic groups in Eurasia and Africa with the native distributions of groups in the Americas and Australia. These data reveal a number of intriguing spatial patterns and are used to test a variety of hypotheses concerning the function of such groups. Analyses provide support for the idea that the factors affecting ethnic diversity have changed in a systematic way with changes in subsistence strategies and socio-political organization. I highlight future avenues for spatially explicit investigations of the evolution of ethnic diversity, and suggest that the evolutionary ecological approach adopted here may provide important insights into processes affecting ethnic diversity in the modern world.

### **Jorge Yamamoto**

A multilevel well-being model from non-Western traditional cultures: fitness, happiness and adaptation.

Previous research has reported high levels of well-being in some traditional developing countries compared to wealth nations. In this presentation, results from a series of studies focused in that paradox, which concludes in a multilevel well-being model are reported. Western well-being theories constitute a source of bias to understand well-being from the perspective of cultures relatively isolated from modernity. This bias was avoided through an Emic and Post-hoc approach. Emic in terms of describing well-being patterns of these cultures from their own perspective, with more than 500 in-depth open-ended interviews. The content analyses of the interviews lead to the development of a psychometric well-being battery, with scales of needs, resources, needs satisfaction, and values, as core components of well-being. Data from 1070 subjects from Bangladesh, Peru and Thailand were analysed using Confirmatory Factor Analyses to identify the emerging factors for needs, resources and values. The need satisfaction scale measures the perception of need achievement using the factorial structure of needs. All variables in the study were integrated using Structural Equation Modelling. In a post-hoc theorising approach, different established theories were compared. Evolutionary theory showed the best fit. The model presented here proposes a multilevel well-being theory composed by universal factors (needs), context (relationship between needs and resources, where resources mediates needs satisfaction) and cultural factors (values). The need factors found in this study differs from western psychological theories. They propose autonomy and competence as universal needs, however, the two factors here reported were a good place to live and to raise a family. The first factor can be associated to ancestral migrations (looking for a good place to live) and the second factor can be related to Hamilton's principle of inclusive fitness, suggesting not only a universal theory of needs but a theory that can be extended to other species. Resources here reported emphasize both, material and cooperative means, coherent with the idea of human evolution as cooperative species, and opposed to the individualistic and ultra-individualistic view from western cultures. Values found in present studies emphasize cooperative facets of human social organisation, coherently with the concept of reciprocal altruism proposed by Trivers. Overall, the proposed theory suggests that Happiness is the wrong question. Fitness is the main goal, adaptation the core process, and happiness is just the emotional feedback in pursuing this game. Implications for wellbeing intervention at the social policy, organisational behaviour, group and individual levels are discussed.

### **Fredrik Jansson, P. Strimling & M. Parkvall.**

The outcome of merging cultures.

A common situation in a cultural exchange is when several groups of people each have a set of traits, and where the groups, due to extensive communication, form a common culture which can hold only one of the traits for each domain or field. For example, such situations occur when tribes or societies unite and develop common norms or language. What will then be the resulting culture that evolves? We have developed a mathematical model of this process and tested it on empirical data. The situation applies to several cultural domains, and a trait particularly suited for studying cultural transmission is language. What makes language especially convenient when doing empirical studies and testing models against reality is the straightforward ability to define what constitutes a trait and the vast amount of data available. There are types of languages called pidgins and creoles that evolved due to limited contact between groups of different linguistic descent and whose evolutionary process thus resembles that of our model particularly well. In our model, agents meet in pairwise interactions and try to communicate. Communication is treated as a coordination game, such that the efficiency of transmission of a cultural trait (for our data, this is a language trait, i.e. a word, a sound or a syntactical feature) may depend on whether the individuals use the same trait in the interaction. We have shown analytically that in

order for a common culture to develop, it is required that agents learn more when they are coordinated than not. Under this assumption, we used exemplary data from the historical demography of Mauritius as input to the model and compared the results to Mauritian creole, giving a good fit. Our model, together with mathematical analysis and simulations, thus gives insight into what are some possible and impossible processes underlying the development of a common culture, and also gives predictions about which traits will win. For our data, the model manages to provide correct predictions taking only demographic considerations, making specific assumptions such as prestige bias unnecessary.

#### 17.10-18.30: Late afternoon sessions 28-30

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#### **Session 28. Symposium: Evolutionary medicine: challenges and future directions 1. (Pasteur)**

##### **Grazyna Jasienska**

Reproductive ecology and female health, and lifespan: energy budgets, physiological trade-offs and antagonistic pleiotropy.

High energetic costs of pregnancy and lactation may cause physiological trade-offs for maternal organism, which partially explains why women with high parity often have poor health in older age and, consequently, reduced lifespan. For women, having adequate energy during all stages of life, including periods of fetal and childhood development, and adulthood, is related to high levels of reproductive steroids hormones. High lifetime levels of these hormones have both beneficial and detrimental effects: they increase chances of pregnancy, but also the risk of breast cancer. Intra-individual variation in energetic status that leads to intra-individual variation in levels of steroid hormones may help to explain the complex relationship between parity and lifespan. This relationship is further complicated by pleiotropic effects of genes, including APOE, PPAR-gamma, IL-10, ERS1, which encode traits potentially important for both fertility and health in women. Modern clinical medicine usually ignores findings from the area of human reproductive ecology, but evolutionary medicine suggests that this knowledge might be useful for medical practice and for programs of disease prevention. Most important aspects are treatment of infertility, prevention of reproductive cancers and prevention of diseases (such as diabetes, cardiovascular diseases, and Alzheimer's) the risks of which often increase in women who had high costs of reproduction. Supported by the Center for Human and Primate Reproductive Ecology (CHaPRE), the Polish National Science Centre and The Salus Publica Foundation.

##### **Elodie Vercken & B. Mauroy**

Don't fall off the adaptation cliff! Asymmetrical fitness costs constrain the evolution of human lung.

The human bronchial tree is a branched network, whose function is to bring air from the mouth to the exchange surface, the acini. The relative size of the branches up and down a bifurcation  $h$  is known to be a critical parameter: too small, the circulation is impaired by the large hydrodynamic resistance of the tree; too large, the volume occupied by the bronchial tree reduces drastically the volume left in the chest for the exchange surface. In order to evaluate lungs efficiency, theoretical models of the bronchial tree have been developed. These models have been able to predict the optimal value for the parameter  $h$  resulting from the compromise between hydrodynamic resistance and exchange surface. Although quantitatively close, the predictions from these models are consistently inferior to physiological measures of the parameter  $h$ . These models of optimal bronchial tree geometry are based on a function for lungs efficiency, equivalent to a fitness function in evolutionary biology. This fitness function is asymmetrical around the optimal value, therefore cliff-edge effects are expected to play a role on the evolution of lung geometry. Cliff-edge theory (Mountford, 1969) states that in presence of variability in phenotypic expression, expected fitness has to be calculated over the range of possible phenotypes. If the fitness function is asymmetric, the best strategy is not at the apparent maximum of the fitness function. We propose a mathematical model of population dynamics to predict quantitatively the influence of cliff-edge effects on the evolution of bronchial tree geometry. Once fitted with empirical data, this model is able to give precise information on: 1/ the "quantity" of variability suffered by the human bronchial tree ; and 2/ the distribution of bronchial tree geometries in the population. In particular, our model predicts that, even if the population is adapted at best, there always exist individuals whose bronchial trees are associated with costs larger than average, and who ought to be more sensitive to geometrical remodelling.

**Kaspar Staub, U. Woitek, M. Henneberg & F. Rühli**

Challenging perspectives in evolutionary medicine: microevolution of human morphology and its medico-social impact.

Contribution for the SYMPOSIUM ON EVOLUTIONARY MEDICINE: Human morphology is undergoing important evolutionary changes. The socio-economic and clinical impact of such alterations of human anatomy is mostly underestimated so far. The newly founded Centre for Evolutionary Medicine (ZEM) at University of Zürich is focusing on the microevolution of human morphology as one of its major research directions. We present not only current research data on such morphological traits but also address particularly their medico-social impact. Based on skeletal samples from ancient to modern times as well as based on historical and modern Swiss Armed Forces conscription data ( $N>100\ 000$ ) we are able to show significant increases in body dimensions, decrease in skeletal robustness and increase in morphological variability. Using data from the Swiss Armed Forces (universal conscription, representing 80-100% of the 19-year-old men alive) on the secular trend of height and BMI between 1875-2010 we can trace the evolution of body dimensions. The trends of height, weight and BMI in Switzerland show the following pattern: The positive secular height trend (15 cm height gain in 130 years) begun in the 1890s (birth years 1870s) and slowed down a hundred years later in the 1990s (birth years 1970s). Contrary, the trend in body weight did not slow down in the recent decades, average weight continued to rise. Consequently, average BMI, which did not change between 1879 and the 1950s, shows a marked two-step increase at the end of the 1980s and again since 2002. A further particular focus of our contribution lays on the alterations of the axial skeleton (eg. increased frequencies of spina bifida occulta). We will also address specific consequences for public health measures (target groups for weight reduction programs), medical teaching (variability of anatomical structures) or clinical research (low back pain etiology).

**Gillian Ragsdale & R. Foley**

Parent-of-origin effects on empathy.

Genomic imprinting is a violation of Mendel's laws that enables selection to act on genes depending on parent-of-origin. This study tested whether there are parent-of-origin effects on the heritability of empathy in the general population as part of a larger question concerning the role of imprinted genes in the evolution of human cognition and behaviour. The measure tested was the Empathy Quotient, which was developed by The Autism Research Centre for use with both general and clinical population samples. To test genomic imprinting hypotheses correlations in EQ scores between pairs of full, maternal and paternal siblings were compared using path analysis. Where scores are influenced by imprinted genes, the actual correlations between pairs of siblings will differ from those expected following classical Mendelian inheritance in a predictable way depending on what kind of imprinting is influencing the trait and the fit of Mendelian and imprinting models can be compared. The results of this study support a model of competing maternal and paternal influences on strong and weak empathy.

## Session 29. Responses to cheaters. (*Antigone3*)

**Toko Kiyonari, M. Furukawa & T. Hasegawa.**

Defectors can pretend to be nice but their Machiavellian nature are revealing.

Although there are some evidence suggesting that people can visually discriminate defectors from cooperators (e.g., Brown et al., 2003; Verplaetse et al., 2007), few studies have investigated the relationship in the situation in which defectors have incentives to deceive others (e.g., Frank et al., 1993). In the real world, we must detect defectors who have incentives to make a good impression on their potential partners. The purpose of this study is to investigate if naive observers can distinguish defectors from cooperators even when defectors are motivated to present themselves positively. In our series of studies, we used two types of video clips of 73 targets as stimuli: one was a video clip of their faces when they expressed their thoughts on a fairy tale. The other video clip captured their faces after the targets finished their decision in a sequential PD game as first-players. The first-players were told that their video message would be sent to their potential partners who would see the clip before their decision. Thus all targets had strong incentives to make a good impression on potential partners. The targets also played another one-shot, Stag Hunt (SH) game where cooperation was the best choice insofar as the other also cooperated. Judges (total  $N=509$ ) from different universities judged if the targets cooperated or defected after watching either the story-clips or the message-clips. When the message-clips were shown, the

targets' decision in either game was not correctly predicted by judges. However, when the story-clips were shown, "hard-core defectors" who defected in both games were discriminated from others. Additional analysis revealed that the targets' Machiavellianism scores were correlated with judges' predictions and ratings irrespective of the type of the video. High-Machs were judged as non-cooperative and not-good people. In sum, identification of "hard-core defectors" was possible only when the targets had no incentives to manipulate their impressions. Interestingly, targets who scored high on Machiavellianism were judged as defectors even when they had incentives to manipulate others.

### **Kumiko Mori**

Cheater detection in young adults with and without autistic spectrum disorders: a study using Wason selection tasks.

Mori and Yukihiro (in preparation) investigated autistic children's behavior in ultimatum games and showed that older children with autistic spectrum disorders (ASD) made more equal allocations than younger children, but their refusal rates of unequal offers stayed low in all age groups. This result was discussed as the hypothesis that children with ASD acquire prosocial behavior mostly by learning social norms, but might have difficulty learning about appropriate punishment of cheaters, a form of behavior that is not always prosocial. In other words, children with ASD may have deficits in the mechanism that automatically produces conditional cooperation, so their performance might depend almost entirely on learning opportunities. This study further hypothesizes that the difficulties of people with ASD with regard to retribution stem from the immaturity of their automatic attention to cheaters. Therefore, their performance on three types of Wason selection tasks was compared with that of control groups. A total of 30 Japanese with ASD (18-30 years old,  $M = 23.37$ ,  $SD = 3.42$ ; FIQ 61-117,  $M = 85.64$ ,  $SD = 16.81$ ; VIQ 60-113;  $M = 84.36$ ,  $SD = 17.93$ ) and 51 typically developed Japanese undergraduates (19-21 years old,  $M = 19.82$ ,  $SD = .62$ ) participated in the experiment. Each participant was involved in the following three types of Wason selection tasks: descriptive, precaution, and social contract. The descriptive task was conducted first, and the order of the other two tasks was randomized. The participants in both the ASD and control groups performed better on the precaution and social contract tasks than on the descriptive task ( $p < .01$ ). However, the percentage of participants who chose logically correct answers in the social contract task was marginally significantly lower in the ASD group ( $p = .07$ ), although the difference between the two groups was not significant in the descriptive and precaution tasks. In other words, the participants with ASD displayed a lower level of performance only in the social contract task, although they displayed a level of performance equivalent to that of the control group. This result offers evidence suggesting that people with ASD experience some deficits in the automatic mechanism that governs their conditional cooperation.

### **John Dickhaut, R. Lunawat, B. Xin & Gregory Waymire**

Language sustains trust and cooperation even when uncertainty enables widespread cheating on social contracts.

Symbolic communication through language is unique to homo sapiens, is universal among human societies, and provides a foundation for extensive cooperation. Yet language carries with it a fundamental conflict: honesty can lead to group gains from cooperation, but deception can enable personal gains at the expense of others. Social contracts and cheater detection can promote the trust necessary for cooperation, but we know little about whether and how language facilitates trust when uncertainty permits cheaters to disguise their behavior. We explore this issue using a multi-period experiment with uncertainty where partners can communicate through a chat mechanism. We first show that communication leads to social contracts that dramatically increase and sustain group gains. This occurs even though social contracts are frequently breached and disguised with ambiguous actions and deceptive communication. We next introduce an evidentiary institution that allows potential cheaters to lift the shroud of opaqueness created by uncertainty. The evidentiary institution largely eliminates cheating, but surprisingly does not increase group gains. The reason why partners' trust and cooperation are sustained without the evidentiary institution is that cheaters act subtly and refrain from extracting maximum gains that might arouse a partner's suspicion. The consequence is that returns to potential victims of cheating are only modestly lower, which allows cheaters to sustain their partners' involvement in exchange. Our experiment demonstrates that symbolic communication is a major force in securing group cooperative gains in part because humans have the ability to finely balance personal gains from deception against the need to sustain the trust that generates group gains.

**Daniel Bello & C. Obadia**

Cheater detection in marketing channels.

This work draws on both microeconomy and evolutionary psychology to explain interfirm exchanges. It is based on the assumption that the social contract theory which applies to individuals and small groups can be extended to the study of firms interactions. This paper intends to explain the determinants and consequences of counter-productive behaviors in interfirm commercial exchanges by drawing a bridge between the concept of opportunism found in the theories of the firm and the mechanism of cheater detection examined in the social contract theory developed by evolutionary psychologists. We show that the distributor's opportunistic behaviors trigger, among the supplier's boundary staff, a social categorization of the intermediary as a cheater. Yet, interfirm trust developed during previous exchanges disturbs the social categorization process and attenuates its development. The negative impact of trust on cheater detection is further reduced by the difficulty of the foreign market (as perceived by the supplier). Finally, we show that distributor's opportunistic behaviors are detrimental to the economic performance of the supplier. However, cheater detection has no impact on performance and, as predicted by evolutionary psychology, is solely a determinant of the dissolution of the business relationship through the sharp reduction of interfirm trust. The hypotheses were tested with longitudinal survey data from a random sample of 122 French exporters. The analysis was performed with structural equations modeling. An export setting was selected because one key condition for the cheater detection subroutine to be activated is that the situation should provide violators with the ability to easily violate the social contract. Indeed, in an export relationship the geographical distance fosters extreme levels of information asymmetry, which shields violators from the exchange party scrutiny. Furthermore, the two parties belonging to two different socio-cultural groups exempts violators from social control. A multi-item reflective scale was developed to assess the cheater detection (categorization of the distributor as a cheater). A formative latent measure assessed the distributor's opportunistic behaviors. The other constructs were measured with well known scales from the marketing channels literature. In a first survey, exporters assessed their relationship with one overseas intermediary and provided the scores corresponding to "interfirm trust" and "difficulty of the foreign market". Two years later, the respondents were asked to evaluate the same export relationship and provided the scores for the remaining scales. Measurement instruments characteristics were assessed. Finally, the structural models displayed adequate fit indices and the results supported the hypotheses.

**Session 30. Evolutionary psychology. (Rondelet)****Willem Frankenhuys & K. Panchanathan**

Individual differences in developmental plasticity may result from stochastic sampling.

The ability to adjust developmental trajectories based on experience is widespread in nature, including in humans. This plasticity is often adaptive, tailoring individuals to their local environment. However, why some individuals are more sensitive to environmental influences than others is less clear. Explanations include differences in genes and differences in prior experiences. Here, we present a novel hypothesis in the latter category. In some developmental domains, individuals must learn about the state of their environment before adapting accordingly. Because sampling environmental cues is a stochastic process, some individuals may receive a homogenous sample, resulting in a confident estimate about the state of the world. These individuals specialize early. Other individuals may receive a heterogeneous, uninformative set of cues. They will keep sampling. As a consequence, individual variation in plasticity may result from different degrees of confidence about the state of the environment. After developing the hypothesis, we conclude by discussing three empirical predictions.

**Brice Gouvernet, S. Combaluzier, J.-L. Viaux & M. Bussoletti**

Binge drinking, evolutionary psychology and handicap theory.

Binge drinking is a relatively new and recent patterns of alcohol consumption that affects more and more people, who are more and more young. It consists of drinking alcoholic beverages with the primary intention of becoming drunk within a short period of time (Renaud, 2001). Strongly influenced by the Standard Model of Social Sciences (Cosmides and Tooby, 1990), the interpretations often emphasize the cultural, social and economic aspects of the Binge Drinking. However, these interpretations omit mostly the "natural" and universal aspects of alcohol consumption (eg, see Nesse, 2001) and hardly explain the very heart of the binge drinking phenomenon ie the search for being stoned and high, the "fix", and this in a specific context. Indeed, Binge drinking is not a lonely

seach for a high: here, alcohol is generally consumed in groups. Therefore consumers and consumption typologies are difficult. Beyond the scientific issues, such classifications, however, seem to be especially useful for therapeutics topics. To overcome these shortcomings, an evolutionary psychological approach of binge drinking is proposed in this communication, in line with the hypothesis of Diamond (1992). After a presentation of some adaptive aspects, both individually and socially, of the alcoholic high, evolutionary hypotheses are formulated according to handicap theories formulated by Zahavi (1975, 2003). We think that if an heavy and quick alcohol consumption may be an indicator of maladjustment among those people who are most at risk, it may also represent a strategic handicap that some adopt to demonstrate their value to others. These hypothesis are tested on the basis of responses to questionnaires assessing the motivations of particular individuals to consume alcohol, traits and cohesion of the personality or their abilities and desires to integrate social groups. The results,in course of analysis, focus on the responses of young adult subjects. In addition to allow to propose a typology of types of binge drinkers, the results will determine if it is relevant or not to consider binge drinking as a phenomenon, at least in part, bound by evolution rules. Ultimately a better understanding of heavy alcohol consumption is expected with this work.

**Guillaume Dezecache, L. Conty, M. Chadwick, L. Philip, D. Sperber & J. Grèzes.**

"That she makes you happy makes me happy": evidence for transitive emotional transmission in humans through facial signaling.

While there is scientific agreement on the fact that emotional facial expressions have a communicative function, little work has been done to investigate their signaling power. This characteristic is however essential if one wants to argue that emotional facial expressions not only provide information about the emotional state of the emitter but may also be produced to inform one's conspecifics, widely and efficiently, about the presence of a threat or a reward in the environment. It is important then to show that facial expressions can support emotional transmission on a larger scale than dyadic interactions. For that purpose, crowd situations are highly relevant. Crowd panic and crowd exhilaration can be characterized by their emotional homogeneity. For that emotional homogeneity to occur, emotional information must circulate across many individuals. Thus, the information must be encoded in a robust medium. Here we hypothesize that facial expressions constitute a robust medium of emotional signaling and can account for large scale emotional transmission. To test this hypothesis, we recorded the physiological cues of participants placed in a situation of transitive emotional contagion (which might occur in crowds on a much larger scale). Within this paradigm, we recorded the physiological cues of an individual C observing the face of an individual B watching an actor (individual A) displaying either fearful or joyful expressions. We also tested the hypothesis that the transitive emotional contagion would be more intense when B and C are involved in an affective relationship with one another. Our preliminary results show that the information contained in facial expressions is sufficient to produce a transitive emotional contagion of joy, suggesting that facial expressions may constitute an important medium for large scale emotional signaling in humans.

**Ben Brilot, D. Nettle, J. Read & M. Bateson.**

Predicting general vs specific anxiety: a model of the adaptive generalisation of defensive behaviour. Anxiety disorders in humans manifest in both specific (e.g. phobias) and general (e.g. generalized anxiety disorder, GAD) forms but no adaptive conceptual framework exists to explain why this might be the case. We present a mathematical model that provides clear predictions of when we might expect induced anxiety to be generalised or specific. There is considerable empirical evidence supporting the notion that anxiety functions in regulating defensive behaviours in anticipation of environmental threats. For example, high anxiety individuals pay increased attention to threatening stimuli; interpret ambiguous stimuli as being more threatening; and are more responsive to potentially threatening stimuli, e.g. unexpected loud noises. We therefore start from the assumption that anxiety plays an adaptive role in modulating defensive behaviours to an appropriate level according to the degree of (perceived) threat in the environment. To understand the generalisability of anxiety we assume that threats (more formally fitness-reducing events, or punishers) occur in different forms or types in the environment. We allow for the possibility that these punishers may require differing defensive responses in order to nullify their effects. Using a signal detection theory approach we specify that an individual must detect and respond appropriately to two potential punishers but has some uncertainty about the probability of their occurrence due to noisy environmental conditions. With this set-up we can ask, if the probability of one type of

punisher occurring increases, when should the individual increase their defensive response to only this punisher (specific phobia) and when should they also increase defensive responding to cues from an alternative punisher type (generalised anxiety). There are two trivial instances of when anxiety should be generalised: first, if the individual's ability to cope with the two punishers is correlated (i.e. the individual has some variable vulnerability to punishers in general); and second, if the two types of punisher co-vary in the environment. More interestingly, we found that generalised defensiveness is predicted when the correct defensive behaviour for one punisher is at least partially appropriate for avoiding the alternative punisher. For example, if running away is the correct response to one punisher (A) and partially useful for avoiding an alternative punisher (B) then a perceived increase in the probability of punisher A should result in a higher chance of running away in response to cues from punisher B. We discuss how our predictions relate to the current understanding of the aetiology of anxiety disorders.

18.30: 19.30: Late afternoon sessions 31 - 33

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### **Session 31. Symposium: Evolutionary medicine: challenges and future directions 2. (Pasteur)**

#### **Elizabeth Uhl**

Expanding the perspective: animal diseases and evolutionary medicine.

An evolutionary perspective is increasingly being embraced in medicine and is now considered essential for a comprehensive understanding of disease. To date the evolutionary medicine movement has concentrated on the evolutionary aspects of human disease, however only a very few diseases are truly unique to humans. For example, for dogs alone, of the 450 reported canine diseases approximately 360 are analogous to human diseases. Add this to the fact that many animals live in very close association with humans and thus share exposure to the same environment, it becomes clear that an integrative knowledge of the evolutionary aspects of disease can provide a framework that greatly enhances the understanding of human diseases. Extension of the reach of evolutionary medicine to include animal diseases also opens up a much broader range of experimental research questions. For example, human gene association studies have identified potential gene targets in a wide variety of diseases, but the gene manipulation studies required for confirmation and characterization of phenotypic effects cannot be performed on people. Animal models will therefore be needed for these critical cause and effect studies. However, although much of what is known about human diseases has been learned from the study of animal models, the evolutionary influences that molded animal phenotypes and how they may differ from those influencing humans have rarely been considered in their selection. Because of this, animal models have not been fully utilized in studies of disease and the lack of an evolutionary perspective has contributed to a serious 'prediction problem,' to wit that many of the findings from studying animal models do not apply to the human disease. In addition, animal models have traditionally been based only upon their similarities to the human diseases and their differences have either been ignored or considered a weakness. An evolutionary perspective that considers both humans and experimental animals in the environmental contexts in which they evolved will make investigations of the differences between the human and animal manifestations of diseases, especially those with the same etiology, as equally insightful to the understanding human disease as are interspecies similarities. Such an integrated evolutionary perspective on disease has the potential to provide a unifying context to the study of disease just as it did for biology and genetics.

#### **Rudi G.J. Westendorp**

Selection for human longevity.

Human longevity has long been considered to be beyond evolutionary control. Over recent decades however, various adaptive theories have been put forward that favour post-reproductive survival in women, enhancing the reproductive success of their (grand) children. In polygamous populations older men frequently continue to sire children up to an advanced age. Such an effect may have contributed also to selection for human longevity. From 2002 through 2010 we have prospectively followed 28,994 individuals in 1,703 households from a contemporary polygamous African population, with a demographic structure and environment that probably resembles our evolutionary past more closely than recent developed societies. In a full kin analysis, using a two-sex model, we have assessed the effect of the presence of women and men aged fifty and above on offspring survival and reproduction in their households. Our results suggest that human longevity evolved predominantly through

selection for longevity in older men, rather than through selection favouring post-reproductive survival in older women. As survival up to old age under adverse conditions critically depends on fighting infection, these findings underpin a central role of the (innate-) immune system in regulating longevity and the inverse, the ageing process. Previously, we have pointed to a immunological trade-off between reproduction and longevity. Now, by comparing the expression of the (innate-) immune system in an original adverse environment in Ghana and the nowadays affluent environment in developed countries, we better understand the occurrence of inflammation mediated age associated diseases such as atherosclerosis, apathy and dementia that are part of our current life histories.

**David van Bodegom, M. Rozing & R. Westendorp**

Socioeconomic status determines sex dependent survival of human offspring.

**BACKGROUND** In polygamous societies, rich men have high reproductive prospects through the marriage of multiple wives. Evolutionary, rich households would therefore benefit more from sons. **RESULTS** In a large polygamous population of 28,994 participants in rural Africa, after eight years of follow-up for survival and fertility, men in rich households had twice the reproductive prospects of women. In line with evolutionary expectation; in rich households more sons were born; sons had higher survival and sons had better nutritional status. **CONCLUSIONS** These findings could reflect a higher vulnerability of sons to poor conditions. They are also in line with differences in parental investment as hypothesized by Trivers and Willard. Irrespective of the underlying mechanism, the differential survival of sons and daughters dependent on socioeconomic status maximizes reproductive success in this polygamous society.

**Session 32. Risky decisions. (*Antigone3*)**

**Sandeep Mishra & M. Lalumière**

Mind the gap: Evidence that inequality causes risk-taking.

Income inequality has been associated with various forms of risky behaviour at the aggregate level, including teenage pregnancy, violence, substance abuse, and crime. Little experimental research, however, has examined whether there is a causal link between inequality and risk-taking. Although risk-taking is typically considered irrational or pathological, an evolutionary approach suggests that risk-taking may be adaptive in certain environments. Risk-sensitivity theory suggests that decision-makers should elevate risk-taking in situations of high need, where need describes disparity between an individual's present and desired (or goal) states. Inequality is a particularly salient condition of need that manifests regularly in the real-world. Consequently, we predicted that increased risk-taking should be observed among induced victims of inequality. Furthermore, we predicted that elimination of the experience of inequality would lead to subsequent reductions in risk-taking. In four experiments, we examined whether people exhibit higher risk-acceptance after experiencing inequality manifesting through (a) extrinsic systemic inequality or (b) perceived intrinsic competitive disadvantage. Results indicate that inequality manifesting through both systemic inequality and competitive disadvantage play a causal role in motivating risk-taking behavior. Specifically, the experience of inequality motivated elevated risk-taking, and subsequent removal of the experience of inequality resulted in decreased risk-taking. Results were obtained controlling for individual differences in risk-propensity and sensitivity to justice violations. These findings represent the first experimental evidence demonstrating that inequality has a causal effect on engagement in (and disengagement from) risk-taking behavior, and provide further support for risk-taking as an adaptive response to conditions of disparity.

**Caroline Ugglå & R. Mace**

Sexual risk-taking in the face of HIV - A life history perspective.

Life history theory predicts that sexual risk-taking will increase under high extrinsic mortality. However, where HIV is widespread unprotected sex comes with a risk of death and failure to reach reproductive goals. In this study we examine individual and environmental factors associated with condom use in sub-Saharan Africa. We use data from the Demographic and Health Surveys to analyse records of sexually active women of reproductive age (15-49) and construct logistic multilevel models with 'condom use at last intercourse' as a binary outcome. We control for individual life history variables and include regional and Primary Sampling Unit (often equivalent to a village) level effects. Model selection was used to find the best fitting model. Results indicate that there are

significant differences in condom use between countries, regions and PSUs and that a proportion of this variation is attributable to regional HIV prevalence. On an individual level condom use was positively correlated with education and wealth, and negatively correlated with age, rural residence and number of children at home. Interestingly, regardless of one's own education and wealth, the education and wealth of other women within the same PSU was positively correlated with condom use. This suggests that incentives for risk averse behaviour are formed not only by individual but also by village level characteristics.

### **Session 33. Disgust. (*Rondelet*)**

#### **Dieneke Houben**

Different forms of disgust.

Objectives: Disgust problems have been used as a model for moral judgement. Nichols (2002), for example, studied the moral-conventional distinction with disgust problems. Normally, in studying the moral-conventional distinction participants read scenario's whereby some moral or conventional norm is violated and are asked questions about permissibility, severity and influence of authority figures. Nichols asked similar questions with disgust scenarios and found that they elicited similar responses moral problems. Disgust is not a unitary phenomenon (e.g. Olatunji et al, 2007) and disgust experiences can be triggered by a variety of stimuli, such as bad taste, fear of contamination, etc. Some forms of disgusting behaviour can be potentially harmful for bystanders, other forms not or far less so. Nichols (2002) used disgust examples in his scenarios which had a risk of contamination and could therefore harm bystanders (such as spitting). This study investigated whether forms of disgust with a limited chance of harm to bystanders would give the same response in the moral-conventional distinction. Methods: Questionnaire study with moral-conventional distinction questions with different disgust scenarios varying in potential harm for bystanders. Similar scenario's were used as Nichols had done and other scenario's were derived from a well-known disgust scale (Olatunji et al. 2007). Results: 157 participants answered moral-conventional distinction questions about a number of disgust problems. Nichols' findings regarding the moral-conventional distinction were confirmed when Nichols' own question were used, but there were different results for other disgust problems, where there was no potential harm for bystanders. Conclusion: disgust scenarios elicit different responses in the moral-conventional distinction and this did vary with the risk of harm to others . Maybe, potential harm for bystanders has been specifically selected for and not only disgust as bad taste.

#### **Joshua Tybur, D.V. Becker & V. Griskevicius**

Mapping disgust in the moral domain.

When asked to describe what elicits the emotion disgust, individuals reference a wide range of objects, acts, and concepts. Despite some consensus that a group of disgust responses functions to motivate pathogen avoidance (e.g., "pathogen," "core," or "physical" disgust), there is less agreement on the nature and function of disgust responses to moral offenses. Some theorists have suggested that disgust does not exist in the moral domain, and others have argued that it exists, but is elicited by a relatively narrow set of moral violations. This talk first reviews existing theories of what elicits moral disgust, and why these concepts elicit disgust. Then, a series of studies describes a) what research participants describe when asked to write about times that they were morally disgusted and physically disgusted by another person, b) how a separate sample rates their emotional responses to the nominated moral and physical disgust elicitors, c) unique patterns of behavioral avoidance in response to morally versus physically disgusting individuals, and d) distinctions between disgust and anger in response to moral and physical disgust elicitors. Results suggest that physical disgust is largely elicited by individuals who possess cues for pathogen presence, whereas moral disgust is largely elicited by individuals who impose social costs on others by acting in non-cooperative manners.

#### **Mícheál de Barra & V. Curtis**

Does disgust predict fewer infections? A study of health and the behavioral immune system in rural Bangladesh.

The emotion disgust is argued protect against pathogenic infection, functionally analogous to the immune system. Individual differences in disgust sensitivity (the strength of peoples emotional reaction to disgust cues) should therefore predict the number of infectious illness a person contracts.

Method

We tested this hypothesis in a sample of 412 young adults from rural Bangladeshi population with limited access to modern health care. Disgust, hygiene, health and other relevant variables were measured in a randomized cross sectional survey. Both disgust and hygiene were varied across a 0-4 scale.

People high in disgust sensitivity were less likely to have contracted the four most common infection related illnesses over the previous 12 months: flu (OR:0.6 CI:0.42, 0.85), gastric pain (OR:0.31 95% CI:0.21, 0.45), cough (OR:0.33 CI:0.23, 0.48), and vomiting (OR:0.47 CI:0.32, 0.68). In a Poisson regression both hygiene ( $\hat{\beta}^2 = -0.51$ ,  $p<.001$ ) and disgust ( $\hat{\beta}^2 = -0.24$ ,  $p<.001$ ) predicted total number of infections, controlling for age (n.s.), sex (n.s.) and socio economic status (n.s.). Disgust sensitivity was unrelated to number of non-infectious illness over previous 12 months ( $\hat{\beta}^2 = -.1$ ,  $p = .1$ ).

In our study, differences in behaviour and emotional sensitivity had a significant impact on risk of contracting an infectious disease. While replication with more objective measures of health and psychological traits is desirable, these results support the notion that disgust functions as a protective mechanism and that infectious diseases played a significant role in the evolution of human behaviour.

#### 20.00-21.00: Keynote

**Randolph Nesse – University of Michigan, USA**

Maladaptation and natural selection.

Darwinian medicine and HBES exist thanks to Bobbi Low's presence at a 1983 seminar when I got up the nerve to share my theory of senescence. She was appalled: "Don't you even know about group selection? Haven't you read Williams 1957? Don't doctors learn evolutionary biology?" I spent the next few years learning evolution, researching the pleiotropic theory of senescence, and looking for an evolutionary biologist who wanted to explain disease. George Williams was looking for a physician collaborator. We worked together for the next two decades. We began by asking how selection shapes diseases, but soon realized that this is the wrong question. When we instead asked why natural selection shaped traits that leave us vulnerable to disease, progress came quickly. By 1991, "The Dawn of Darwinian Medicine" offered six evolutionary reasons why bodies are vulnerable. The power of evolution to explain maladaptations is still new and growing. Evolutionary medicine will improve human health, but its immediate future is at risk because mistakes are so easy to make. My attempt to help prevent them, "Ten Questions for Evolutionary Studies of Disease," makes some of my own mistakes all too obvious.

George and I also struggled together to cope with his implications of his discovery that selection acts mainly at the level of the gene. This is one of humankind's great psychic traumas. He drew the logical conclusion: if selection inevitably shapes behaviors that maximize inclusive fitness, then everything living must be inherently selfish. Controversy continues unabated. Why does the explanation for altruism motivate such vicious battles? Because reputations are at stake. The idea that altruism is biologically selfish makes people feel personally accused. They defend their reputations by attacking the idea and anyone who promotes it. Many also feel the reputation of their species has been impugned. This motivates defenses of group selection and a dozen other possible naturalistic explanations for human goodness. Mary Jane West-Eberhard's description of social selection is a neglected but particularly important explanation. The fitness payoffs from traits that make an individual a preferred partner can shape prosocial traits as extreme as a peacock's tail. Costly capacities for altruism and empathy give big advantages if they make one a preferred partner. They also make culture possible, creating new selection forces. Such explanations for human sociality will eventually be woven together into a moral fabric that binds the discoveries of George Williams, but adapting fully to the trauma may take decades.

## SATURDAY, JULY 2<sup>nd</sup>

9.00-10.00: Plenary 4

**Andrew Whiten** - University of St Andrews, UK.

The evolution and ontogeny of conformity, overimitation and culture.

During the past decade or so, much evidence has accumulated to show that apes, including chimpanzees and orangutans, sustain multiple-tradition cultures in the wild, with captive social 'diffusion' experiments confirming they have the requisite social transmission mechanisms in place to facilitate this: accordingly, major features of culture in our shared common ancestry can now be inferred (A. Whiten, Phil Trans R Soc B 366, 997-1007). Here I briefly reprise this 'story so far' and then focus particularly on what I suggest are the related phenomena of conformity and overimitation, each of which has attracted more recent focused attention in the comparative and developmental work of my own research group and that of others.

Conformity has been defined most commonly as a 'copy the majority' rule, and more specifically by Richerson, Boyd and colleagues as an exaggerated bias to prefer whatever a majority of groupmates are seen to do (best distinguished, I suggest, as 'hyperconformity'), a bias that theoretical modeling has suggested is necessary to stabilise cultural variations. However conformity has also been identified with the power of social learning to overrule conflicting individual preferences, which can occur even in dyadic contexts. When this is combined with following the majority, we have a particularly strong manifestation of conformity. This is well established in humans, consistent with the significance of cultural transmission in our lives.

Overimitation is seen when individuals copy all a model does despite conflicting evidence that some elements are causally unnecessary. Overimitation thus shares features with conformity in the latter sense noted above. Overimitation has recently been identified in several studies of human social learning, particularly among children. Here I review our recent studies with chimpanzees and capuchin monkeys that suggest they share with us some basic conformity effects, as do some other species recently studied by others. This indicates that cultural transmission may be sufficiently significant in these species that conformity biases become selected for.

On current evidence, by contrast, the more particular phenomenon of overimitation appears to represent a specifically human bias. I review our own and others' recent studies that have provided evidence for overimitation being an automatic, human universal. At first surprising when we identified it in young children, more recent studies have shown this bias to become more common with age in certain contexts, extending even into our adult lives.

10.00-11.20: Morning sessions 34-36

### Session 34. Cultural transmission. (*Rondelet*)

**Alex Mesoudi**

Variable cultural acquisition costs constrain cumulative cultural evolution.

One of the hallmarks of the human species is our capacity for cumulative cultural evolution, in which beneficial knowledge and technology is accumulated over successive generations. Yet previous analyses of cumulative cultural evolution have failed to consider the possibility that as cultural complexity accumulates, it becomes increasingly costly for each new generation to acquire from the previous generation. In principle this may result in an upper limit on the cultural complexity that can be accumulated, at which point accumulated knowledge is so costly and time-consuming to acquire that further innovation is not possible. In this presentation I first review existing empirical analyses of the history of science and technology that support the possibility that cultural acquisition costs may constrain cumulative cultural evolution. I then present macroscopic and individual-based models of cumulative cultural evolution that explore the consequences of this assumption of variable cultural acquisition costs, showing that making acquisition costs vary with cultural complexity causes the latter to reach an upper limit above which no further innovation can occur. Further analyses show that this upper limit is dependent on the mode of cultural transmission (direct bias resulting in higher complexity than indirect bias, in turn yielding higher complexity than random copying), population size (larger populations maintain higher cultural complexity as found in previous models, but only up to the upper limit imposed by acquisition costs), and cultural innovations that themselves reduce innovation or acquisition costs (which generate realistic initial

exponential growth in cultural complexity). In sum, variable cultural acquisition costs represent an empirically observable phenomenon with significant consequences for cumulative cultural evolution.

### **Julie Coults & K. Eriksson.**

The advantage of several cultural parents in cultural transmission.

A fundamental question when we think about knowledge acquisition is – how do we learn? Social learning, whether it is learning through observation of people's behaviour or through being instructed on how to perform a particular task, means that we learn from others. However, transmission is never perfect, so cultural elements may be lost due to transmission errors. The probability of loss will of course decrease if there is more than one opportunity for social learning. Recent modelling work (Enquist et al. 2010) has drawn attention to the importance of the number of cultural parents available. In brief, the argument goes as follows: Learning several times from the same cultural parent is pointless if that cultural parent has already lost the cultural element. Therefore, the amount of culture retained ought to be higher if social learning trials are spread over several cultural parents. We offer a first experimental test of this model, using the serial reproduction method (Bartlet, 1932). Our experiment involved 320 participants divided over four generations of cultural transmission, two modes of transmission (written or oral), and three patterns of transmission ("single transmission", "double transmission" and "two cultural parents"). We used a version of a story about a traveller that has been used in a previous cultural transmission study. In condition 1 ("single transmission"), 80 participants (40 written transmission/40 oral transmission) read or heard the story once before recalling it; in condition 2 ("double transmission"), 80 participants (40 written transmission/40 oral transmission) read or heard the same story twice before recalling it; in condition 3 ("two cultural parents"), 160 participants (80 written transmission/80 oral transmission) read or heard the recalled story from two participants from the previous generation. This means that participants in the two cultural parent condition heard two different versions of the story. Results: The "two cultural parents" condition resulted in significantly greater recall accuracy further down the transmission chain than the "double transmission" condition. Both these conditions were superior to the "single transmission" condition. These findings confirm Enquist et al.'s proposal. The paradigm of several cultural parents also opens up new lines of research for experimental work on cultural transmission.

### **Helen Wasieleski**

Ratcheting up the transmission chain with a functional task: identifying the social learning mechanisms of cumulative cultural evolution.

Culture consists of shared information acquired by members of a population through social learning. A specific social learning mechanism, imitation, may be required to produce the highly complex culture that is characteristic of humans. Imitation has been distinguished from a related mechanism, emulation, which involves copying observed products but not demonstrated behaviors. I tested the hypothesis that imitation is required for cultural accumulation using a transmission chain study of 604 individuals. Participants in this study were assigned to experimental microsociety groups and asked to build weight-bearing devices from reed and clay. I manipulated social information availability by blocking visual access to other group members or their clay and reed devices, and attained a measure of cultural accumulation by assessing the success of the devices at holding weight. This task is unique in that previous experimental work on social learning mechanisms of cumulative cultural evolution has relied upon computer-generated scenarios or experimental tasks with less ecological relevance. This study is also the first to gather video data about the actual behaviors used to complete the task, rather than using information availability to infer the social learning mechanism in use. With video data, I was able to identify instances of imitation by comparing demonstrator and observer behaviors. My results indicate that behavioral information is necessary for device designs to improve in later cultural generations. When only information about end-products was available, groups did not demonstrate improvement in the functionality of their devices. Therefore, in contrast to similar studies of cultural transmission, these data suggest that emulation is not sufficient for accumulation of information. Preliminary analysis of the video data supports the imitation hypothesis for cumulative cultural evolution. These results contribute to defining the evolutionary history of human culture, and have important implications for understanding human cognitive evolution.

### **Luke McCrohon**

Implications of a two-stage model of cultural transmission on the potential life history strategies of cultural replicators.

Human behavioral phenotypes have evolved through the interaction of two evolutionary processes; biological evolution acting on our genes, and cultural evolution acting on our culture (Richerson & Boyd 2005). Following Darwin, research in the biological sciences has produced a detailed, mechanistic, theory of biological evolution. But as yet, no comparable theory of cultural evolution exists. The possible foundations for such a theory can however be found in Dawkins' (1976) conceptualization of memes; replicating units of cultural information. Several attempts have been made to build on this idea, but consensus has never been reached concerning even the most basic of a meme's properties (Rose 1998). Amongst other things, disagreement exists over where memes are physically located in relation to the brain, and whether or not a phenotype/genotype distinction applies to them. In recent work, McCrohon (2011) showed that much of the confusion surrounding meme definitions can be resolved by moving away from the direct application of biological metaphors to cultural evolution. McCrohon departed from the familiar single-stage lifecycle of genes, and instead made use of a two-stage lifecycle in defining memes. With one stage located in the brain, and one in the external environment, earlier disagreements on meme location and phenotype/genotype distinctions could be effectively sidestepped. Significantly, this was done without abstracting away the details of the replication process (cf. Blackmore 1999). In this paper we investigate the implications of this model on the potential life history strategies it makes available to memes. The model distinguishes not only two stages of meme encoding, but also implicitly distinguishes two stages of meme replication; brain-to-environment and environment-to-brain. This increases the range of viable replication strategies available to memes. The combined replication across the two stages that determines the overall replicative success of the meme. Provided replication at one step is sufficient to compensate, any arbitrarily low rate of replication at the other stage can potentially be included as part of an overall successful replication strategy. It is argued that such "unbalanced" strategies make possible memes requiring more effort or knowledge to produce than any single individual is capable of. Strategies are not simply defined by the relative replication rates of their stages, but also by how those rates are achieved. It is further argued that the given replication rates for both stages may result from various combinations of single-stage replicator fecundity, copying fidelity and longevity, further increasing the range of viable meme strategies.

### **Session 35. Facial attractiveness 1. (*Antigone3*)**

**Ferenc Kocsor, T. Bereczkei & A. Feldmann**

Females recruit more brain areas than males while viewing attractive opposite-sex faces.

Face perception is underpinned by a distributed neural system in the human brain. Several studies showed that facial attractiveness, as a highly salient social cue, influences behavioral responses. It was also found that attractive faces evoke distinctive neural activations compared to unattractive or neutral faces. As mate choice for females is more costly and risky than it is for males, we hypothesized that gender differences might occur during the processing of opposite-sex faces. We predicted that attractive opposite-sex faces elicit higher activation in some brain regions in females than in males. Furthermore, we also aimed to investigate whether females utilize the same brain areas involved in the evaluation of socially relevant facial clues as males, but more actively, or whether some regions exist which are activated only in females (but not males) while observing images of potential sexual partners. Several months prior to an fMRI session volunteers rated opposite-sex facial images. From these subjects 8 males and 8 females participated in an event-related fMRI experiment. They were shown attractive and relatively unattractive faces, based on their individual ratings in the preceding study. MRI data were acquired on a 3-T Siemens TrioTim scanner. Second level statistical analysis of all subjects showed elevated brain activations for attractive faces in contrast to less attractive faces in those regions which are known to play a role in face perception, and for which it has previously been reported to show enhanced activation with increasing attractiveness level (e.g. medial and superior occipital gyrus, fusiform gyrus, precentral gyrus, anterior cingulate cortex etc.) However, when gender as a confounding variable was included in the model, it revealed that subjects' gender influenced the activation pattern. The analysis of male subjects as a group did not lead to significant results. In contrast, beside the activations mentioned above, females showed additional brain activations in the insula, left superior temporal gyrus, left cerebellum, left medial frontal gyrus, right superior frontal gyrus and left hippocampus. As predicted, attractive opposite-sex faces activate more extended brain

regions for females than for males. These areas are thought to be involved in basic emotions and desires (insula), detection of intentions (superior temporal gyrus) and memory retrieval (hippocampus). From these data we speculate that because of the risks of mate choice faced by women during evolutionary times, selection might have preferred a sophisticated neural system for females to assess attractiveness and social value of male faces.

**Amanda Hahn, R. Sprengelmeyer & D. Perrett**

The incentive salience of facial beauty: impact of face type and own perceived attractiveness.

Previous work has shown that viewing attractive faces results in activation of the brain's reward circuitry, suggesting that beauty has motivational salience. The present study was designed to investigate how facial appearance of adults (same-sex and opposite-sex) and infants (both male and female) motivates behaviour. Heterosexual participants completed a "pay-per-view" task which allows for the increase or decrease of presentation time via a set of alternating key-presses. Women worked harder to view infant faces than did men, although both sexes differentiated between the more- and less-cute infant faces. Men allocated much more effort for opposite-sex than same-sex adult faces. In women this pattern was apparent but less striking. Both sexes differentiated the high and low attractive versions of opposite-sex faces, in terms of effort to alter viewtime. Perceptions of own attractiveness were found to influence behaviour towards same-sex faces in women; those that considered themselves of above average attractiveness worked to increase viewtime for same-sex faces, while those who considered themselves below average attractiveness did not work to view same-sex faces. Results suggest that men and women are motivated to view reproductively significant face categories and that intra-sexual competition may have a role in motivation.

**Carmen E. Lefèvre, R. Whitehead, D.W. Hunter, D. Xiao, B.P. Tiddeman & D.I. Perrett**

Reading the face: cues of sex and health quality from skin texture.

Skin texture, both unevenness of colour distribution and surface topography, has recently been linked to perception of health in faces (Fink, et al., 2006, 2008). These findings held when observers were presented with skin patches cut from the cheek rather than with whole faces (Matts et al. 2007). In particular colour homogeneity was correlated with both health and attractiveness ratings. In the current study we aimed to further advance the understanding of the relationship between skin texture and health perception by quantifying skin texture at different spatial scales (coarseness levels). Skin patches free of beard or stubble (288x268 pixels) were cut from the left cheek of 30 people (19 female, age mean=21.07 SD=4.36). These were rated separately for skin 'quality' and masculinity on 7-point Likert scales (1=very bad quality, 7 =very good quality and 1=very feminine, 7=very masculine) and classified for sex (Binary-scale) by 317 (208 female, age mean 36.01 SD=11.75) participants. Additionally 78 patches from a different sample (38 female, age mean=20.6, SD=1.75) were sex classified by 40 participants (28 female, age mean 24.7, SD=6.56). Images were analysed in CIE L\*a\*b\* colour space where variation on the a\* or red-green colour axis is affected primarily by prevalence of blood and variation on the b\* blue-yellow colour axis is most affected by melanin pigment. Each image was analysed for texture unevenness separately in CIE L\*, a\* and b\* using Gabor-wavelets in six spatial frequencies and two orthogonal orientations (Tiddeman et al. 2001). Factor analysis of the twelve texture scores yielded 4 factors corresponding to different spatial scales of texture on each CIE colour axis. The factors mainly loading on medium spatial scale texture were significantly correlated with mean skin quality ratings. Regression analysis showed that both red-green texture and blue-yellow texture predicted quality ratings independently. Masculinity ratings were highly correlated with factors loading on small scale texture in each colour space. For sex classification by participants was significantly above chance-level. Subsequent analysis of the sex categorisations revealed that both small and medium size texture in L\*, a\* and b\* independently predict perceptual decisions. These findings indicate that different skin texture attributes influence the perception of health and sex, such judgments may well affect assessment of mate-choice decisions. In particular medium sized unevenness may be indicative of poor health.

**Session 36. Cognitive development. (*Pasteur*)**

**Olivier Morin**

How strong a motivation is imitation?

Many current research trends in cognitive or social science give imitation a crucial weight in human decision-making. Some anthropologists assume that cultural transmission is fuelled by a drive to copy those behaviors that

are manifested by prestigious or numerous individuals. Some evolutionists claim that this propensity may have sufficed to make altruistic behaviors evolutionarily stable in humans. Some social scientists have published statistical analyses of social networks purportedly showing that obesity, suicide or loneliness readily spread along social ties. Yet others have sought to explain the diffusion of innovations as being driven by the prestige of 'influentials'. Most of these studies have one assumption in common, to wit, the idea that imitation has tremendous motivational weight - that we are willing to incur huge costs in order to follow a crowd or a leader. Defenders of imitation argue that this hypothesis is not incoherent with assumptions of bounded rationality, that it is supported by decades of work in social psychology, and that it allows us to make sense of social phenomena that would otherwise remain mysterious. This paper will try to show, to the contrary, that viable decision heuristics should prefer imitation only in a very restricted set of circumstances: when direct information bearing on the costs and benefits of a behavior is scarce, or when the behavior's payoff is dependent upon other people's actions, but not when the costs are important and salient (as is frequently the case with suicide, altruistic sacrifice, and detrimental cultural choices that imitation is supposed to explain). Experiments in social psychology are often put forward to show that human imitation is not so rational. In these experiments, however, the cost of imitation is often nonexistent, and at any rate quite small compared to the costs assumed by those models that use imitation to explain suicide trends or altruistic sacrifice. Arguments to the contrary, coming, for example, from the study of over-imitation phenomena, will be addressed. Finally, recent and less recent statistical and historical work will be used to show that the evidence for the spread of costly behavior through imitation (negative informational cascades, suicide epidemics, prestige-biased diffusion, etc.) has probably been overestimated.

### **Cristina Moya**

Verbal cues of language use promote inductive inference in children.

Natural selection may have predisposed humans to detect or infer correlations between linguistic group membership and other cultural traits if such associations recurred during human evolutionary history. We test this possibility by studying children's and adults' responses to audio cues of language use in the Peruvian altiplano. We find that children, but not adults, use linguistic cues to make inductive inferences, despite not having preferential memory for the language labels or exhibiting explicit biases against outgroup language users.

### **James Riviere**

Manual search behavior for objects moving out of sight in young children and non-human primates.

Children younger than 3 years have difficulty with search tasks that involve hidden displacement. Thus, toddlers have been found to fail on a 3-location search task involving invisible displacements of an object, namely the C-not-B task (cf. Rivière & Lécuyer, 2003, 2008; Rivière & Falaise, 2011). In this task, children emit a strong bias toward the last cloth that the experimenter's hand passes under, which has been labeled the C-not-B error. Recent studies suggest that adult non-human primates also fail search tasks with objects moving out of sight. Hood, Hauser, Anderson and Santos (1999), for example, presented cotton-top tamarins, a New World monkey species, with the display used by Hood (1995). Like human children, there was a significant tendency to search in the container underneath the tube where the food was dropped, even though aligned tubes and containers were not connected. In Experiment 1 of Hauser's study (2001), rhesus monkeys were presented with an apparatus similar to that used by Hood (2000). Like human toddlers, adult rhesus failed to locate a piece of apple dropped behind an opaque screen and into a cup sitting on a solid table; instead of searching in the correct cup, they searched in the cup underneath the table. Santos (2004) presented adult rhesus monkeys with a task in which a plum was rolled into a solid wall behind one of two opaque barriers. The animals needed to locate the plum based on the position of the wall that blocked the plum's trajectory. Santos (2004) found that rhesus macaques searched incorrectly, apparently neglecting information about the location of the wall. In fact, 80% of the animals searched for the plum behind the barrier nearer to the ramp, that is, the spot closest to where they saw the plum disappear behind the screen. Children's strong bias to search the C location appears to be reminiscent of non-human primates' strategies of searching in the location nearest to where the food moved out of sight. Such observations lead to examining the question of ecological rationality and the adaptive nature of the C-not-B error. Evolutionary developmental psychology assumes that natural selection has facilitated patterns of behaviors and cognitions that affect how children make sense of and adapt to their world (Bjorklund & Smith,

2003). From this theoretical perspective, the C-not-B phenomenon is not an error. In contrast, it can be viewed as a functionally correct choice in some environmental contexts.

**Laura Cristina Stobäus, M.L. Seidl-De-Moura & V.S.R. Bussab.**

Cooperation development in childhood: possible effects of maternal postpartum depression.

This research is part of a larger study, the Thematic Project Fapesp (nº 06/59192) "Postpartum Depression as a risk factor for the child development: an interdisciplinary study of factors involved in its genesis and its consequences". It is a longitudinal research based on the evolutionary perspective, concerning postpartum depression (PPD) effects on mother-infant interaction of a high-risk low income Brazilian sample of women. One analysis from a functional perspective suggests that PPD may be considered a strategy to obtain greater parental investment on child, in which the mother reduces her investment on the child and then other caregivers can compensate the mother's temporary inability to care for her child. This potential adaptive value of PPD contrasts with possible negative ontogenetic effects: studies suggest impairment on mother-infant interaction and in child development. Our goal is to investigate whether there are differences in socio-emotional and cognitive development of three year old children whose mothers presented or not PPD, evaluated by cooperation tasks. In order to a child cooperate with another person, he/she must understand the intentions of another, share the focus of attention and have a motivation to help. In the third year of childhood, the child becomes more sensitive in relation to desires and actions of peers, so they could predict the behavior of others and understand when the goal wasn't achieved. Our sample was composed by 50 three years old children, 16 boys (32%) and 34 girls (68%); 25 mothers had depression after four months postpartum (evaluated by the Edinburgh Postnatal Depression Scale - Brazilian version). We proposed two cooperation tasks, one of which involved helping the experimenter (previously unknown to the child) and the other consisted on assisting the mother. Most children preferred to assist the mother than the experimenter, but among them, girls presented more cooperative behaviors toward the experimenter than boys. Chi-square analyses did not present significant results in socio-emotional and cognitive development of those children, as assessed in cooperation tasks, between the groups with mothers with and without PPD. We can formulate two interpretations of those results which are not mutually exclusive. Adaptive strategies of development may have been employed by the children of mothers with PPD, compensating possible differences in mother-infant interaction and/or according to the functional PPD hypothesis the alternative caregivers may have been successful in compensating effects of maternal PPD. Sponsors: CAPES, CNPq and FAPESP.

**Session 37. Cooperation, conformity and coordination. (Pasteur)**

**Tiago Soares Bortolini**, K. Vieira Dantas, N. Lima Soares, R.D. de Souza jr, T. Pinto Soares, W.T. Hattori & M.E. Yamamoto

The good samaritan probably is good for his own group - cooperation and religiosity among Brazilian undergraduates.

The study of religiosity (defined as the degree to which one is involved in individual or group religious activities) from an evolutionary perspective is very new and rare among scholars. It is possible to divide scholars between those who hypothesize that religion is a by-product of other adaptations and those who posit that religion had an adaptive value for our species. Between the "adaptationists", some believe religiosity to be a cooperation enabler within large groups, since it would work as a group marker. The aim of this research was to evaluate if undergraduate students tend to benefit their own religious group more than others in a variation of the public goods game. A total of 181 students answered a religiosity questionnaire divided between individual religiosity (religious behaviours practiced alone e.g.: praying at home) and group religiosity (behaviours practiced with groups of people, e.g.: going to church). Afterwards, subjects took part in an adapted version of public goods game. Four ballot-boxes, each one with the inscriptions "Catholics", "Evangelists", "Other religions" and "Atheists" were placed behind a folding screen. Each subject received three candy bars that could be donated to any ballot-box. For each three bars donated we told the participants we would add another one to the amount donated to the ballot-box after three rounds. After three rounds, all the candy bars in each ballot-box were divided among those who self-reported, in the previous questionnaire, to pertain to the religion orientation correspondent of the ballot-box. There was no difference in the number of candy bars donated in all rounds between those individuals that self-reported pertaining or not to a religious affiliation. We also found no difference when considering the religious group of each individual. However, when taking into account the individual score on the religiosity questionnaire, those who scored more tended to donate more chocolates in general. Also, individuals from a religious affiliation tended to donate to the ballot-box representing their own group. Those results suggest that religion could function as a group marker although it is not clear why those individuals who scored more on the religiosity questionnaire donated more than those who scored less. Implicit and explicit group pressure are discussed as potential influences on the amount of individuals' donation.

**Rochele Castelo-Branco**, M. Leitão, C. Dantas, **Fívia Lopes** & M.E. Yamamoto

Religion or generosity: what matters when you cooperate with someone?

Research conducted in evolutionary approach suggests that religious behavior would have arisen in the context of cooperation between social groups and cheaters detection, being related to identity maintenance, cohesion and group cooperation. Considering the hypothesis that religion promotes cooperation within groups, this research empirically investigated the role of religion as a group marker, exploring the relationship between religious behavior and cooperative actions. The experiment consisted of an online donation game, in which the goal was to gather the maximum tokens at the end. Participants were individuals from three different groups related to the practice and involvement with religion: Catholics, Evangelicals and atheists. The game scenario featured virtual opponents whose profiles showed the professed religion and information such as age, education level and marital status. The distribution of virtual opponents and their donation during the game were previously programmed by the system, so that in certain groups, religious opponents were more generous in their donations, and in other groups, non-religious assumed this role. In each round the subject could choose one player to whom donate tokens. The tokens donated by individuals to players with the same religious orientation (or absence thereof) has enabled to evaluate whether the information on religion acted as a factor favoring the groups (in-group behavior). It was observed that in the groups on which religious opponents were more generous, Evangelicals subjects donated more tokens to Evangelicals opponents than to others players. On the other hand, in those groups where non-religious opponents were more generous, atheists donated more to non-religious virtual players. These results showed the strength of reciprocity and in-group behavior converging toward the same direction, generating preferential donations to individuals within the group. However, Catholic subjects facing non-religious donor situation in the game, have made more outgroup donations, since they have donated more to opponents of different religions than to Catholic ones, a result that points to reciprocity rather

than in-group influence. Our findings suggested that Evangelicals and atheists were more selective in their donations, displaying stronger in-group behavior when generous players were in-group members. In both groups of participants, in-group behavior was enhanced by reciprocity, which is in accordance to literature. Catholics, on the other hand, are rather controlled by reciprocity than by group coalition. Our data suggest that reciprocity is a well established predisposition and that group coalition modulates it, favoring in-group reciprocity without eliminating out-group reciprocity.

**Anuska Irene Alencar, N.B. Dutra, J.F.B.C. Farias & M.E. Yamamoto.**

Criticizing those who do not cooperate encourages children's donations in a public goods game. Game theory offers tools to study decision problems in social dilemmas, as the game of public goods, which is the simulation of investment from a group of individuals to a common good, with the possibility of individuals profiting from this common good, without investing the same amount as the others. The public goods model has been investigated in children and suggests that factors such as group size, information on the number of sessions and the presence of an adult observing the donations play a considerable influence on the amount of donations. In children, it is considered that the sensitivity to social stimuli from adults may be an important factor of influence on their behavior, including the cooperation. In this sense, the purpose of this study was to investigate the influence of adult verbal feedback on children's behavior in a public goods game. 280 children from public schools in Natal / RN / Brazil , aged between 6 and 12 years, divided into 15 groups, participated in the games. These children were subjected to eight rounds of a game in which they received three candy bars and should decide how many of these they would donate anonymously to the common fund. At the end of each round, praises for the largest donations were given in 5 groups (positive feedback), criticism for smaller donations or its absence were presented in 5 others (negative feedback), and the remaining 5 groups were not presented with any comments (control groups). After the verbal feedback, the common fund was multiplied by three and shared equally between all individuals in the group, regardless of the amount donated. We found that the children cooperate more in situations of negative feedback, with girls being more susceptible than boys. These results are probably related to the expectation of punishment suggested by the feedback (although there was no actual punishment), and the avoidance of negative feelings such as shame and guilt. These results are supported by the theory of strong reciprocity, which proposes that punishment evolved as a strategy to manage cheaters in cooperative situations.

**Samuele Centorrino, E. Djemai, A. Hopfensitz, M. Milinski & Paul Seabright**

Smiling is a costly signal of cooperation opportunities: experimental evidence from a trust game. We test the hypothesis that "genuine" or "convincing" smiling is a costly signal that has evolved to induce cooperation in situations requiring mutual trust. Potential trustees in a trust game made video clips for viewing by potential trusters before the latter decided whether to send them money. Ratings of the genuineness of smiles vary across clips; it is difficult to make convincing smiles to order. We argue that smiling convincingly is costly, because smiles from trustees playing for higher stakes are rated as significantly more convincing, so that rewards appear to induce effort. We show that it induces cooperation: smiles rated as more convincing strongly predict judgments about the trustworthiness of trustees, and willingness to send them money. Finally, we show that it is an honest signal: those smiling convincingly return more money on average to senders. Convincing smiles are to some extent a signal of the intrinsic character of trustees: less honest individuals find smiling convincingly more difficult. They are also informative about the greater amounts that trustees playing for higher stakes have available to share: it is harder to smile convincingly if you have less to offer.

**Session 38. Facial attractiveness 2: Effects of face colouration. (*Antigone3*)**

**Ian Stephen, I. Scott, V. Coetzee, N. Pound, D. Perrett & I. Penton-Voak**

Cross-cultural effects of colour, but not morphological masculinity, on perceived attractiveness of men's faces.

Much attractiveness research has focused on face shape. The role of masculinity (thought to be a relatively stable shape cue to developmental testosterone levels) in male facial attractiveness has been examined, with mixed results. Recent work on the perception of skin colour (a more variable cue to current health status) indicates that increased skin redness, yellowness and lightness enhance apparent health. It has been suggested that stable cues

such as masculinity may be less important to attractiveness judgements than short-term, more variable health cues. We examine associations between male facial attractiveness, masculinity and skin colour in African and Caucasian populations. Masculinity was not found to be associated with attractiveness in either ethnic group. However, skin colour was found to be an important predictor of attractiveness judgments, particularly for own-ethnicity faces. Our results suggest that more plastic health cues, such as skin colour, are more important than developmental cues such as masculinity. Further, unfamiliarity with natural skin colour variation in other ethnic groups may limit observers' ability to utilise these colour cues.

**Bernhard Fink, P.J. Matts, D. d'Emiliano, L. Bunse, B. Weege & S. Roeder.**

Colour homogeneity and visual perception of age, health and attractiveness of male facial skin.

Visible skin condition in females is known to affect facial age, health and attractiveness perception. Skin colour distribution, driven by melanin and haemoglobin dispersal, in shape and topography standardized female faces can account for up to twenty years of apparent age perception. While this is supported by people's ability to discern female age even in isolated, non-contextual skin images, a similar effect in the perception of male skin remains to be shown. This study investigated male facial skin by looking at how skin colour homogeneity and colour / chromophore distribution affects visual perception of age, health and attractiveness. Cropped skin cheek images from 160 British men (all Caucasian) aged 10 to 70 years were blind-rated for age, health and attractiveness by a total of 308 participants. The skin images and corresponding melanin/haemoglobin concentration maps were objectively analysed for homogeneity using Haralick's image segmentation algorithm. Skin images of younger males were judged as healthier and more attractive. Age, health and attractiveness perception was strongly related to melanin and haemoglobin distribution, whereby more even distributions lead to younger age and higher health and attractiveness perception. Skin aging associated to melanin distributions is a stronger informant of age perception, whereas haemoglobin distribution drove health and attractiveness perception. We conclude that male skin colour homogeneity (like those of females), driven by melanin and haemoglobin distribution, influences the perception of age, health and attractiveness.

**David Perrett, D. Re, R. Whitehead, I. Stephen, V. Coetzee, C. Lefèvre, F. Moore, D. Xiao & G. Ozakinci**  
Face colour, health, lifestyle and attractiveness.

Skin colour has a marked influence on facial appearance: enhanced skin redness and yellowness increases perceived health and attractiveness. We have investigated the associations of skin colour (measured spectrophotometrically) with health and lifestyle 5 studies of young adults. Prolonged stress impairs immune function and can reduce fertility. The over-activation hypothalamic-pituitary-adrenal axis in chronic stress may affect skin colour through alteration of melanin synthesis, enhanced oxidative stress or changes in cutaneous blood flow. In studies 1-2 (n=89, 50 Caucasians) we found raised baseline cortisol levels were associated with decreased skin redness. Skin yellowness and lightness were unrelated to cortisol levels. Thus low skin redness may be indicative of chronic physiological stress. In studies 3-4 (n=73 Africans, n=93 Caucasians) we found participants reporting modest exercise levels – one hour vigorous exercise per week – differed in skin colour from those reporting less exercise. For the African sample, skin colour changed in a manner consistent with increased resting skin blood perfusion. For the Caucasian sample (study 4) the colour change associated with increased exercise was consistent with increased levels of melanin and blood in the skin. In study 5 (n=38 Caucasians) we found that skin yellowness was associated with dietary intake of fruit and vegetables: increased consumption enhanced skin yellowness within 6 weeks. We used a successive presentation paradigm to measure perceptual thresholds for change in facial attractiveness due to change in skin colour. Colour thresholds were equivalent to a diet change of 1.2 portions of fruit and vegetables per day and possibly 1 hour vigorous exercise a week. We conclude that even small improvements to diet or exercise may be accompanied by perceivable benefits to skin colour and attractiveness. Overall, the results indicate that skin colour can provide visible cues to health condition.

**Frederick T. Wehrle, B. Fink & H.M. Schaefer**

The love for red – how receiver biases may influence human attraction to skin colouration.

Humans, like most catarrhine primates communicate intensely via colourful stimuli. Most prominently, human and non-human catarrhines have been shown to respond to a variety of colour stimuli that are associated with distinct food qualities during foraging. Trichromatic colour vision allows catarrhines to perceive red colouration, and red stimuli are assumed to be very effective in capturing their attention. It is a long-standing hypothesis that

individuals may exploit the receiver bias of an innate attraction to reddish colours in the mating context through pelage and skin colouration. This hypothesis is difficult to experimentally disentangle from the hypothesis that red colour signals evolved because skin colouration indicates the hormonal status of individuals. Using novel computerised methods, we first experimentally assessed the colour preferences of humans for social, sexual, and food-related stimuli. Second, we tested the prediction unique to the exploitation hypothesis that colour stimuli from one context (e.g., fruit colour) can influence the reactions of humans to colour stimuli in a distinct context (e.g., skin colouration). Remarkably enough, men are influenced in their skin colour preference by red stimuli, women, however, are not. Based on our results we discuss the applicability of the receiver bias model to the evolution of human skin colour signals as well as its limitations.

### **Session 39. Symposium: *Mating Strategies in Two Cultures: Brazil and Norway.* (Rondelet)**

**Maria Emilia Yamamoto, C. Sbruzzi & F. Castro**

Remarriage in a low income community in Northeast Brazil: Women's profile and value in the marriage market.

Partner choice processes involve the assessment of a set of characteristics, which have been termed market value. At the mating market an individual, voluntarily or not, presents his(hers) traits to a potential partner and evaluates the partner's characteristics. If both their expectations are met, the relationship starts. But every relationship has its costs and benefits and, if the maintenance of the relationship has higher costs than benefits, the couple usually breaks up and each person enters in the market again. For women, the costs of re-entering the market are higher compared to men. They usually have the responsibility to raise their children and, as youth is a characteristic typically preferred by men in their romantic partners, women that re-enter the market usually have a reduced value. The purpose of this study was to investigate the existence of different women's profiles and how these profiles have affected the choices of their first and second partners for long-term relationships. 33 women from a low-income community in northeast Brazil took part of this study. They answered a questionnaire in which they described themselves, their first and second stable partners, an ideal partner and gave socio-demographic information. The descriptions were based in eight characteristics related to the relationships quality and to self-esteem. To investigate the presence of different profiles in the sample we applied a cluster analysis, which resulted in two groups. One group composed by women with high self-assessment (high self-esteem) and the other with low self-assessment (low self-esteem). The desired ideal partner was similar for both groups as well as first partners' assessments. Nevertheless, the high self-esteem group assessed the second partner and these relationships as higher quality than the low self-esteem group. This study indicates that the possession of high quality characteristics or at least a higher self-assessment can result in the achievement of a high quality partners and greater satisfaction with the relationship, even when expectations about an ideal partner are very similar.

**Trond Viggo Grøntvedt & L.E.O. Kennair.**

Mate value, current partner and ideal partners in a gender egalitarian society.

Partner preferences vary with sex and context – as well as personal mate value and traits. Sexual Strategy Theory (Buss & Schmitt, 1993) suggests that the sexes have different preferences in choice of partners. Men, more than women, choose partners on the basis of physical attractiveness and cues for youth. Women, on the other hand, seek partners that have resources and are willing to share them with her. But there are also important within-sex differences and individual differences. Simpson and Gangestad (1991) suggest that Sociosexual Orientation Index (SOI) is a relevant indicator of sexual relationship preferences. Finally, relationship context will also decide what traits one looks for – e.g. both sexes will seek partners with increased SOI for short-term relationships. However, due to the nature of short-term relationships and sex differences in sexual strategies, men are predicted to show a higher preference for increased SOI in ideal short-term partners. The current study is based on Parental Investment Theory (Trivers, 1972) and Sexual Strategy Theory. Questionnaires were distributed among first and second year students (N=1150, mean age: 21.1) at four campuses in Trondheim, Norway, measuring self perceived mate value, own SOI, and the estimated SOI of current partner, as well as their ideal long-term sexual partner and ideal short-term sexual partner. We expect to find that sex, self perceived mate value, and relationship type will influence ideal partner choice compared to current partner qualities. Preliminary results suggest clear sex differences in preferred age of both actual partners, ideal long-term and ideal short-term

partners in the predicted direction. In addition both sexes indicate a preference for increased SOI in an ideal short-term partner compared to actual partner, but the increase for men is significantly higher. Further results from self perceived mate value will also be presented.

**Felipe Castro, W.T. Hattori, M.E. Yamamoto & F. Lopes**

Long-term romantic preferences in a Brazilian sample: are they satisfied in real relationships?

The sexual strategies theory, through parental investment theory explanations, proposes that sex preferences emerged as a response to distinct ancestral pressures that shaped, in different ways, the behavior of our male and female ancestors. Since female parental investment is largely physiological, in contrast to male investment, it is supposed that men should select their partners paying more attention to reproductive health clues. On the other hand, male parental investment consists mainly of time, energy and resources invested in their children so one would expect that women should look for a helpful partner willing to invest his resources. Indeed these patterns have been observed in many samples across the world. But do people really meet their preferences when they select a long-term partner? Do Brazilian people, who live in a more relaxed culture regarding sex, follow the same pattern present in other countries studied so far? The aim of the present study was to identify and characterize the preference profiles of ideal long-term romantic partners for each sex and investigate if the subject preferences are satisfied in their actual relationships. Based on the joint assessment of nine traits related to physical attractiveness, status and personal characteristics, a total of 145 undergraduate students of both sexes, aged between 18 and 29 years, took part in the study. To be included in this research, participants should be involved in a, at least, 12 month stable relationship. The method consisted in three descriptions (simulations) of an ideal long-term partner using a decreasing pre-determined amount of points. The subjects also provided the description of their actual partner and a self-assessment of their own characteristics. To analyze the long-term preferences we conducted General Linear Model (GLM) tests comparing the subjects' evaluations within simulations and between genders. To verify the relationship between the subjects and their partners, t tests were applied for each trait. Analysis of the ideal long-term profile identified that male participants valued physical traits more than female. Females showed greater interest in resources related traits. The contrast between male and female self-assessments and their partner descriptions showed that their preferences were achieved. In conclusion our results reinforce the typical patterns of sex preferences described in the literature and it adds evidences that sex preferences have an important role in the establishment of romantic relationships. In comparison with the literature, it also shows that cultural variations do not seem to influence male and female preferences.

**Mons Bendixen & Leif Edward Ottesen Kennair**

Judgment of the effectiveness of competitor derogation and strategic self-promotion in world's most egalitarian culture.

Sexual strategy theory (Buss & Schmitt, 1993) proposes that sex of actor and the temporality of the mating context moderates attraction effectiveness. Self-promotion tactics and competitor derogation are expected to be differentially effective for men and women in short-term and long-term mating contexts as shown by Schmitt & Buss (1996). However, replications have been scarce, underscoring to the importance of studying the effectiveness of perceived effectiveness of mate attraction tactics in non-American cultures. A 2 (mating context) by 2 (sex of actor) factorial design was applied for two samples of Norwegian undergraduate students (n=247, spring 2010 and n=273, fall 2010). Students included in the analyses were selected for self-nominated heterosexuality, trustworthiness and age (30 years and younger). The students judged effectiveness of 27 derogation (Study 1) and 28 self-promotion (Study 2) mating tactics across 10 domains presented on a two-page questionnaire. Tactics covered cues to (1) sexual availability, (2) sexual exclusiveness, (3) fidelity (4) current and future recourses, (5) status and dominance, (6) personality characteristics such as selfish, insensitive and commitment, (7) physical attractiveness, (8) intelligence, (9) personal hygiene, and (10) acting dumb. Results suggest that the vast majority of findings from Schmitt & Buss (1996) could be closely replicated in Norwegian students 15 years later. As hypothesized, we found that derogation and self-promotion tactics regarding personality characteristics were judged more effective in long-term mating contexts. Signals of sexual availability was judged more effective when used by women in short term mating contexts and sexual exclusiveness more effective by women in long-term mating contexts. Overall the results from the Norwegian sample mirrored those from the North American sample with a notable exception of intelligence derogation (which was unrelated to sex

of actor and mating context). The results suggest that mate attraction tactics are less prone to cultural influences and national differences in gender equality than the Standard Social Science Model would suggest. The findings from this study clearly strengthen the meta-theoretical perspective of evolutionary psychology in explaining social behavior.

#### 14.30-15.30: Plenary 5

**Jean-Marie Hombert - Université de Lyon, France**

Evolution of *Homo sapiens*: genes, fossils and languages.

Evolution of *Homo sapiens* has often been considered as a chronologically synchronized evolution including anatomical, behavioral and linguistic aspects. In this presentation, we will choose three examples concerning the emergence and diffusion of human language from three different time periods illustrating that these three facets of human evolution developed in a "mosaic" fashion.

Our first example concerns human vocal abilities which have been strongly linked to the position of the larynx. Although it is clear that a lowered larynx allows wider articulatory capabilities for sound production, we will show that this anatomical modification was first associated to sexual differences and only later used for linguistic developments.

It is a great challenge for linguists to propose a "reasonable" date for the emergence of human language. Traditional historical linguistics research is unable to provide scientifically sound hypotheses beyond 10.000 YBP. In order to reach deeper time periods it is necessary to seek other sources of information. One possibility is to evaluate the complexity of our communication system necessary to explain well established human achievements. We will use "sea-crossings" as an example of human activity which could not have been realized without a sophisticated communication system at least 50.000 years ago.

Our final example addresses a topic largely ignored by linguists interested in the diffusion of human language: population size. Recent studies in population genetics have provided a general picture of early human migrations. We will focus on the impact of agriculture on population density and on its connection with the development of linguistic diversity by providing examples from Sub-Saharan Africa (and especially in Hunter-gatherers/Agriculturalists contacts).

#### 15.30-16.50: Early afternoon sessions 40-42

##### **Session 40. Language origins. (Rondelet)**

**Thom Scott-Phillips**

A general framework for the emergence of communication, and why humans are different.

Evolutionary biology defines communication as any action that causes a reaction in another organism, evolved to do so, and where the reaction has also evolved (Maynard Smith & Harper, 2003; Scott-Phillips, 2008). If these conditions are satisfied we can label the action a signal, the reaction a response, and the overall interaction communicative. This definition gives rise to a chicken-and-egg problem: if signal and response are interdependent in this way, then which comes first? The obvious solution to this conundrum is to suggest that either an action or a reaction could first appear for reasons independent of its role in communication, and it could then be co-opted for communication by the other, complimentary behaviour. In empirical studies in a range of domains, this is exactly what is observed, with one exception: humans (Scott-Phillips, 2010). In this talk, I will: (i) present a general framework for the emergence of communication (from Scott-Phillips et al., in prep.); (ii) explain how recent experimental work on the emergence of communication in humans (in particular Scott-Phillips et al., 2009) shows how humans are an exception to otherwise general trends about how communication systems emerge; and (iii) argue that this difference is due to human's rich capacity to recognise and reason about the intentions of others. I will then speculate on the selection pressures that were involved in this development, and hence sketch an outline for the evolution of intentional human communication, including language. Maynard Smith, J. M. S. and Harper, D., 2003, Animal Signals, OUP Scott-Phillips, T. C., 2008, Defining biological communication, Journal of Evolutionary Biology 21(2), 387-395 Scott-Phillips, T. C., Kirby, S., & Ritchie, G. R. S., 2009, Signalling signalhood and the emergence of communication, Cognition 113(2), 226-233 Scott-Phillips, T. C., 2010, The evolution of communication: Humans may be exceptional, Interaction Studies 11(1), 78-99 Scott-

Phillips, T. C., Blythe, R. A., Gardner, A., & West, S. A., in prep., A general framework for the emergence of communication.

### **Helene Cochet & J. Vauclair**

Hand preference for gestural communication and the question of language origins.

The close relationship between communicative gestures and speech acquisition during human ontogeny (e.g., Colonna et al., 2010) raises intriguing questions about the role played by gestures in the evolution of human language. Given the left hemisphere specialization for language in humans, the investigation of hand preference for communicative gestures in human and nonhuman primates can provide further insights into the nature of these speech-gesture links, both at the ontogenetic and phylogenetic levels. Infants' and children's communicative gestures are predominantly produced with the right hand, and this right-sided asymmetry was shown to be stronger than the one reported for noncommunicative manual actions (e.g., Bates et al., 1986; Vauclair & Imbault, 2009). Different patterns of laterality between communicative gestures and manipulative actions have also been observed in captive nonhuman primates (in baboons: Meguerditchian & Vauclair, 2009; in chimpanzees: Hopkins et al., 2005). These results suggest, first, that a left-lateralized communication system, distinct from the system involved in purely motor activities, may control both gestural and vocal communication, and second, that this system may have a deep phylogenetic origin (e.g., Corballis, 2010). Moreover, the study of hand preferences in human adults has not revealed any difference in the mean degree of right-sided bias between noncommunicative actions and communicative gestures (Cochet & Vauclair, in press). In addition, the difference in the distribution of hand preference patterns between adults and infants was shown to be greater for object manipulation than for pointing gestures. These results indicate that hand preference for communicative gestures may be established in early development, in close association with language lateralization, whereas the increase in the degree of handedness for object manipulation may occur later in childhood. Finally, studying the different communicative functions of gestures enables a further examination of the relationship between gestures and language acquisition. The difference in the degree of hand preference between manipulative actions and pointing gestures was shown to be the strongest for informative pointing, a gesture that may be associated with the development of cooperation abilities (Cochet, & Vauclair, 2010). Such cooperative gestures might thus have played an important role in the cerebral lateralization of language. By presenting a number of arguments, including original data of our own, we thus aim to improve current understanding of the evolutionary roots of human communication, including the mechanisms of cerebral specialization for communicative behaviours.

### **Natalie Uomini**

The prehistory of right-handedness: archaeology and ethology.

A right-side manual laterality defines the human lineage. It emerged well before the appearance of *Homo sapiens*. Right-handedness was prevalent among Neanderthals and also existed among *Homo heidelbergensis*, as shown by the fossil and archaeological data from prehistoric hominins. However, the mechanisms driving the evolution of this lateral bias are still unclear. As we know from studies of hand preference in great apes, especially chimpanzees, and humans in traditional societies, the strength of laterality is affected by task complexity. Namely, more complex manual actions tend to be more strongly lateralised. This affects both the individual consistency in hand preference and the homogeneity of hand preference at the group level. Therefore it might represent an important factor in the evolution of right-handedness. In particular, the complex chimpanzee behaviour of nut-cracking has been proposed as a precursor to the first human stone tool-making. In order to test the complexity hypothesis, a "field experiment" was designed in a naturalistic setting at an open-air museum in Lejre, Denmark. This paper will present the pilot study in which 238 humans were video filmed while spontaneously manipulating five prehistoric activities of nut-cracking with stone hammers and anvils, scraping twigs with stone flakes, engraving on pebbles with stone burins, grinding axes on an anvil, and putting together "puzzles" made of flint. The videos were analysed for hand preference throughout the sequences of manual actions. This talk will focus on the results from nut-cracking and flint puzzles: 48 individuals recorded six or more bouts of nut-cracking or puzzle manipulation. The results indicate very clear and stable hand preferences for nut-cracking, even in very young children of pre-writing age. However, in contrast, the flint puzzle elicited ambilateral manipulation. These findings from human behavior will be discussed with respect to the task complexity

hypothesis and we will present our hypothesis on the role of tool-making in the evolution of right-handedness and language.

### **Jean-Louis Dessalles**

Human language may be an ESS after all.

Providing information to conspecifics is a distinctive behaviour of the human species. It is mainly observed in spontaneous conversation, which is a massive and universal behaviour. Yet human language is still an embarrassment for evolutionary theory, as the speaker's benefit remains unclear. The problem is to show how language behaviour can be an ESS (evolutionary stable strategy). Scenarios invoking kin selection, group selection, parochial selection, direct or indirect cooperation, when applied to language, do not predict the universal existence of talkative behaviour, directed at several individuals simultaneously that are not (or loosely) discriminated by speakers. These scenarios also conflict with the fact that not all conversations are about important matters that would have material impact on listeners. Scenarios based on sexual selection are at odds with the fact that both genders are equally talkative. It has been noted that language behaviour is competitive rather than cooperative. Information is more often offered than demanded. As G. Miller puts it, "People compete to say things. They strive to be heard. [...] Those who fail to yield the floor to their colleagues are considered selfish, not altruistic." The analysis of human spontaneous conversation reveals the importance of narratives (~30% of speaking time, ~2 hours per day, ~5000 spoken words a day). Moreover, virtually all narratives report unexpected events. The central and systematic importance of unexpectedness in human communication behaviour, which is unique in primate species, sheds light on a possible biological role for language that would make it an ESS. The present study demonstrates that Social-Costly Signalling theory (Social-CST), initially formulated by A. Zahavi, provides a possible solution to the human language paradox. We could solve the main problem of that theory, which wrongly predicts that only elite individuals should talk. To do so, we connected the systematic communication of unexpectedness to a known fact about hominins: homo species are the only primates in which easy killing at no risk is possible, thanks to the use of weapons (sticks or stones). Easy killing disrupted standard primate politics, based on enforced domination. By systematically reporting situations that are unexpected, human individuals advertise their ability to anticipate surprise. In a context of easy killing, it is a good strategy to share time with individuals who have this ability. We showed that the time-sharing constraint that results from the protection scenario explains why language is a generalized behaviour, not limited to a few information-competent individuals.

### **Session 41. Ovarian cycle stage effects. (Pasteur)**

**Christina M. Larson, M. Haselton, K. Gildersleeve & E. Pillsworth**

Changes in women's feelings about their romantic relationships across the ovulation cycle: causes and consequences.

Numerous studies have documented that women's preferences for masculine, sexy traits associated with high heritable fitness are heightened near ovulation (the high-fertility phase of the cycle) relative to low-fertility days of the cycle. This led us to predict that women's feelings about their romantic relationships and their relationship partners would be more negative on high-fertility days of the cycle than on low-fertility days of the cycle, particularly if their partners do not have the traits women prefer when fertile, such as sexual attractiveness. To test this hypothesis, in a set of two studies, we brought naturally cycling women involved in romantic relationships into the laboratory on high and low-fertility days of their ovulatory cycles. Ovulation near the high-fertility appointment was confirmed using luteinizing hormone tests. In Study 1 we found that women felt less close to their partners on high-fertility days of the cycle than on low-fertility days of the cycle  $F(1, 37) = 3.09$ ,  $p = .05$ . As hypothesized, this was especially true among women whose partners were relatively low on sexual attractiveness (partial  $r = .49$ ,  $p < .001$ ). Importantly, this moderating effect was specific to traits that women especially desire near ovulation, and women whose partners were less desirable on long-term investing traits (for which women's preferences differ little across the cycle) did not feel less close to their partners at high fertility than low fertility (partial  $r = -.18$ , ns). In Study 2, we again found that women felt less close to their partners on high-fertility days of the cycle than on low-fertility days of the cycle,  $F(1, 40) = 4.01$ ,  $p < .05$ . Additionally, we found that women were less satisfied by their relationships ( $F = 6.0$ ,  $p = .01$ ), and more critical of their partners ( $F = 14.09$ ,  $p < .001$ ) on high-fertility days of the cycle than on low-fertility days. These effects were

all significantly moderated by women's ratings of how sexually attractive their partners were; Women's feelings about their relationships and their partners were more negative at high fertility relative to low fertility the less attractive they thought their partners were. Finally, we present preliminary results from a longitudinal study in which we re-contacted participants four months and twelve months after their original participation, and discuss the long-term implications of changes in women's relationship feelings across the ovulation cycle.

**Anna Ziomkiewicz, S. Wichary & D. Bochenek**

Temperament and ovarian steroid levels in reproductive age women.

Recent studies show that personality traits can predict reproductive success in humans. Alternative hypotheses proposed to explain the observed relationships consider mainly behavioral or social pathways. Nevertheless, pregnancy success and childbearing is largely dependent on the biological quality and fecundity of the future mother. Is it thus possible that personality traits in women represent their biological quality and fecundity? To investigate this possibility we conducted the study on a sample of healthy, reproductive age women. We propose that in women temperamental traits which constitute the basis of personality are associated with levels of reproductive ovarian steroid hormones during the menstrual cycle. Methods: 113 Polish urban women aged 25 to 35 collected daily first morning urine sample during their entire menstrual cycle. Specimens were analyzed for the concentrations of ovarian steroid metabolites (PdG and E1G) using enzyme immunoassays. Participants filled in the Formal Characteristics of Behaviour – Temperament Inventory and General Questionnaire collecting temperamental, demographic and social data. Anthropometric measurements were also taken at the beginning and at the end of the study period. Results: Significant relationship was found between temperamental traits of Activity (AC), Endurance (EN), Sensory Sensitivity (SS) and levels of ovarian steroids. In particular, AC and EN were positively related to the level of estradiol metabolites ( $F_{1,107}=4.3$ ,  $p<0.05$  for AC and  $F_{1,107}=5.7$ ,  $p<0.02$ ) while SS was related to levels of progesterone metabolites in the same direction ( $R=0.21$ ,  $p<0.05$ ). The observed relationships were independent from the influence of age, education, physical activity or body fatness. Conclusions: To our knowledge this is the first study which demonstrates that certain temperamental traits such as Activity, Endurance and Sensory Sensitivity are directly related to woman's fecundity. Since those traits correlate with personality characteristics found to be related to overall reproductive success such as Neuroticism, Extraversion and Openness we speculate that link between personality and reproductive success may have a strong physiological basis.

**Kelly D. Cobey, T.V. Pollet, S.C. Roberts, C. Klipping, N. Appels, Y. Zimmerman, H.J.T. Coelingh Bennink & A.P. Buunk**

Reported jealousy differs as a function of menstrual cycle stage and contraceptive pill use: A within-subjects investigation.

An accumulating body of literature suggests that women's preferences and behavior shift across the menstrual cycle; however, comparably little research exists that tests the effect of hormonal contraceptive use on such shifts. Studies that do address this issue are often limited by the use of between-subjects designs. Here we tracked self-reported jealousy via a within-subjects design in twenty-nine women when they were regularly cycling (fertile/non-fertile) and when they were using hormonal contraceptives. Fertility was estimated using trans-vaginal ultrasonography to track follicular growth. This methodology allowed us to identify the fertile window more precisely than has been done in previous research, and to account for anovulatory cycles. Results showed that when regularly cycling, increased conception risk is associated with significantly higher levels of jealousy. Levels of jealousy reported when using hormonal contraceptives were between those which occurred when fertile and non-fertile; however, were significantly higher than those reported during the non-fertile cycle stage. This suggests that hormonal contraceptive use is associated with levels of jealousy which are similar to those that occur during the brief period of fertility in non-contraceptive users. This research is the first to definitively show that behavior, e.g. jealousy, may be influenced differentially by endogenous hormones versus exogenous hormones administered via hormonal contraceptives.

**Karl Grammer, E. Oberzaucher & B. Haslinger.**

Cognition and hormones in females: associative networks and knowledge organisation.

In this study female students in different phases of the menstrual cycle made a test of word associations. The results were analysed and compared in a pathfinder-network. This special network is a model of knowledge representation in which words are portrayed as nodes, and links between nodes represent associations. This

method (pathfinder), developed by Schvaneveldt (1990), generates associative networks from individual's ratings of similarity of word pairs. 51 women had to judge 45 words of the three categories sexual, romantic and neutral in similarity. The networks were compared regarding probability of contraception, partnership and level of testosterone. The number and weights of associative links differed between women with high and low probability of contraception. The level of testosterone had a very big influence on the density of associations, especially among sexual contents. The results imply that free floating sex hormones can influence cognition considerably. The results are discussed in terms of special cognitive adaptations to asymmetric investment in offspring. Schvaneveldt, R.W. (1990) Pathfinder associative networks. Ablex, Exeter, GB.

#### **Session 42. Size matters. (*Antigone3*)**

##### **Priscille Touraille**

Stature sexual dimorphism in *Homo sapiens*: a costly evolution due to gender hierarchy?

Bringing together data and models from diverse research fields (both life and social sciences), this epistemological paper suggests that a convincing hypothesis for the observed stature sexual dimorphism (SSD) in modern *Homo sapiens* is currently missing in scientific arenas due to the absence of a truly interdisciplinary research. SSD in *Homo sapiens* is still said to be a “puzzle” in evolutionary biology. Selected characters of sexual dimorphism have recognized costs of survival in many species. Surprisingly, no model asks about the survival costs that sexual dimorphism could produce in our own species. Human females are amongst the most vulnerable birth-givers in the animal kingdom, mostly due to the difficulty for the foetus' head to pass through the pelvic canal. In paleoanthropology, SSD is classically said to have decreased in the genus *Homo*. This “reduction” is now interpreted by an increase of female size rather than a decrease of male size (via relaxation of male-male competition), primarily driven by selection for a wider pelvic outlet. The bigger the size of a female biped, the wider the pelvic canal: this model is confirmed primarily by obstetrics. The model of “SSD reduction” may be challenged on an evolutionary basis, 1/ because chimpanzees’ dimorphism is as slight as it is in humans, and 2/ because strong dimorphism in hominid ancestry has not been actually evidenced. Considering the fact that selective pressures for a tall female stature appeared quite obviously in an already not very dimorphic species, and considering birthing selective pressures alone, women ought to be as tall, or taller, than men. This is not the reality observed. What type of selective pressures were then at stake to make women smaller than men? Gendered nutritional inequalities are documented in history, ethnology and behavioural ecology. Gender hierarchy is acknowledged in all existing societies by cultural anthropology. From a sociological standpoint, nutritional inequalities should be suspected to be a consequence of any hierarchical social order. This paper discusses that a realistic hypothesis for SSD in our species would be the one implied by unequal protein intake between men and women over the long term. This paper will also consider the poor reproductive success of small men and tall women in European societies, considered recently by evolutionary psychologists as an alternative hypothesis for SSD. From a sociological standpoint, the idea that men should obligatorily be taller than women would also be an effect of the gender order.

**Daniel E. Re, D.W. Hunter, V. Coetzee, B.P. Tiddeman, D.K. Xiao, L.M. DeBruine, B.C. Jones & D.I. Perrett.**

Facial cues to height influence perceived leadership ability.

Judgments of competence and leadership can be made from briefly presented face stimuli. Split-second competence judgments of political candidates closely predict actual election outcomes, yet the nature of the facial cues to leadership remains unclear. Physical height is often associated with political success. For example, every U.S. President since 1896 has been taller than the average American male height, and the majority of U.S. Presidential elections have been won by the taller candidate. Here, we assessed if height cues exist in the face, and if so, whether or not they are associated with perceived leadership ability. We find that cues to height are apparent from faces in European and African faces of men and women. These cues are morphologically distinct from cues associated with masculinity and were not found to alter facial attractiveness. Furthermore, faces averaged from tall people were perceived as better leaders than faces averaged from short people. The ability to make snap judgments from faces may be an evolved trait or learned ability that facilitates social living. This ability would make facial cues to physical stature a salient and influential basis of leader selection in both the past and present.

### **Gregory Webster**

#### **Big and bad: the height-aggression link in men.**

Is height a risk factor for physical aggression in men? From giant elephant seals to wee cottonwood borers, the animal behavior literature is filled with examples of the how larger, taller males aggressively dominate smaller, shorter males. Although research on the height-dominance link in humans is extensive, the literature on the height-aggression link in humans is comparatively short. At least one developmental study has shown that children's height at age 3 positively predicted aggression at age 11 (Raine, Reynolds, Venables, Mednick, & Farrington, 1998). Moreover, weight and measures of direct aggression and physical aggression were positively related in a sample of 88 young Indian men (Archer & Thanzami, 2007). Despite these advances, little research has been done on the role of individual differences in height and physical aggression in North American adult males. Drawing on reactive heritability, facultative calibration, resource holding potential, and the recalibration theory of anger (e.g., Sell, Tooby, & Cosmides, 2009), which suggest that increased height allows taller males the affordance of using physical aggression as a tactic to dominate others, we predicted that men, but not women, would show a positive weight-aggression association for physical aggression, but not verbal aggression, anger, or hostility. In Study 1, a sample of 946 undergraduates (354 men) provided self-reports of their height and their responses to the Brief Aggression Questionnaire (e.g., "Given enough provocation, I may hit another person"). A significant sex by weight interaction emerged for physical aggression but not the other three aggression domains. Simple slope tests showed a significant positive slope between weight and physical aggression for men, but not for women. These findings suggest that the height-aggression link is both sex-specific and domain-specific; it applies only to men and physical aggression. In Study 2, we examined the height-aggression link in 879 National Hockey League players (all men) during the 2009–2010 regular season. Players' heights were significantly and positively related to multiple measures of penalization relating to fighting and aggressive behavior. This finding suggests that the height-aggression link in men applies not only to self-reports of physical aggression, but also a behavioral and interpersonal measure of physical aggression in a controlled setting. Collectively, these results support biologically-based, evolutionary perspectives on the relationship between height and physical aggression in men.

### **Martin Tovee & K. Crossley**

Male and female observer's ideal body size and shape preferences for their own body and their partner's body measured using an interactive body morphing technique.

40 male observers (age 19.1, s.d.=1.0) and 40 female observers (aged 19.8, s.d.=1.7) estimated their own body size and shape, their ideal and the ideal size and shape of their partner using the DAZ studio image manipulation programme (DAZ3D.com). In this programme the shape and size of a 3D representation of a body can be altered. Each part of the body can be altered independently. This allows each participant to create the exact size and shape of the body they want. Each observer made each judgement (i.e. estimated body size, own ideal, partner ideal) twice. Once by altering a 3D body which had been set to be very large and once by altering a body which had been set to be very thin. The two measures were then averaged to give a value for each judgement. The 3D bodies were then exported into 3ds Max (autodesk.com) where the models were set either to the height of the participant (for 'actual' and 'ideal' models) or to the height of the average British man (1.78m) or woman (1.64m) (for 'ideal partner'). From here the models' volume could be determined and the circumference of the bust, waist and hips could be measured. Assuming a standard density of the human body of 1.01 gcm<sup>-3</sup>, it is then possible to calculate each body's weight and then their BMI value for each body (kgm<sup>-3</sup>). The ideal female body set by women (BMI=19.9, WHR=0.66, WCR=0.63) was very similar to the ideal partner set by men (BMI=19.5, WHR=0.69, WCR=0.65). This was a lower BMI than the estimated BMI of 39 of the 40 women. The ideal male body set by the men (BMI=26.4, WHR=0.88, WCR=0.70) was very similar to the ideal partner set by men (BMI=25.4, WHR=0.86, WCR=0.74). This was a lower BMI than the estimated BMI of roughly half of the men and a higher BMI than the other half. The results are consistent with a preference for an ideal male and female body size being consistent across both genders, and being largely independent of the physical characteristics of the observers themselves.

### **Session 43. Language. (*Rondelet*)**

#### **Greg Bryant.**

Signals and cues in interdisciplinary communication science.

Communication involves the production and perception of acts or structures that help organisms navigate their social environments. The study of human communication behavior has become increasingly interdisciplinary over the years, and discipline-specific uses of various terms have become problematic as researchers work across domains of inquiry. Specifically, non-evolutionary researchers often conflate the meanings of distinct terms such as signals and cues because they fail to consider ultimate explanations of the underlying traits they study. Moreover, even within evolutionary psychology, many researchers studying communication phenomena have failed to distinguish between different classes of communicative behaviors that often blurs theoretical positions. Following Maynard-Smith and Harper, an adaptationist communication science requires distinguishing between a) acts or structures designed to affect perceivers (i.e., signals) and, b) acts or structures that have some effect on perceivers, but were not selected for those effects (i.e., cues). Many researchers across the social, and even biological sciences, fail to make this basic distinction. In this talk I will entertain some possibilities why this is happening, including but not limited to, 1) historical uses of certain terminology (e.g., “signal” in signal detection analysis and “cue” in psychophysics), 2) failure to consider evolutionary functions and phylogenetic origins of traits, and 3) failures to require sufficient evidence before making claims of adaptation. I will use an example from my own research (vocal cues of ovulation) to illustrate the problem, and provide some preliminary suggestions how we might address this issue not only within the evolutionary behavioral sciences, but across the social sciences more generally.

#### **Kyle Thomas, W. Mendes, S. Pinker & C. Nocera.**

Do you want to see my etchings? Evidence for a game-theoretic model of indirect speech.

Traditionally, pragmatics theories in linguistics have assumed that conversational partners are involved in a cooperative interaction, but work in signaling theory indicates that such an assumption is unlikely to always hold. Oftentimes, relationship negotiation involves a mixture of cooperation and conflict, and imperfect information can create a dilemma for a speaker who does not know the sentiments of his conversational partner. A recent game-theoretic model suggests that indirect speech can be an optimal strategy to help speakers maximize their gain in such negotiations, while evading potential legal, emotional, and reputational costs. This theory proposes that indirect speech allows this by (1) offering plausible deniability in contexts with tangible costs, (2) preventing potential emotional and reputational costs when there are not tangible costs, and (3) that such emotional and reputational costs are avoided by preventing common knowledge of the speaker's intentions. Psychophysiological evidence is presented for the claim that indirect speech helps evade emotional costs, along with evidence that indirect speech does indeed minimize the spread of rumors by preventing common knowledge.

#### **Tanya Broesch & G. Bryant.**

Universals in infant-directed speech: Evidence from Fiji, Kenya, and US.

When speaking to infants, adults typically alter the acoustic properties of their speech. Previous research across cultures has found that adults use higher pitch, increased pitch range, and more pitch variability when addressing infants and small children. To date, however, no studies have thoroughly examined basic acoustic properties of infant-directed speech (IDS) in traditional societies. Studying non-industrialized populations is important because researchers have claimed that western parents use IDS significantly more than their non-western counterparts, with some scholars suggesting that particular populations do not use IDS at all. Vocal communication with infants must often rely quite heavily on acoustic information, and less on linguistic structure; therefore, we should expect universal acoustic patterns that help solve adaptive problems associated with caregiver-infant communication. We examined pitch production (measured as fundamental frequency/F0) in mothers and speaking to both infants (IDS) and adults (ADS) in three cultures: Fiji, Kenya, and US. Recordings were obtained from videotaped caregiver-dyad interactions, and interviews with adults. In all three cultures, speakers used higher pitch when speaking to infants relative to adults, and also used significantly greater pitch variation (F0 SD) and pitch range (F0 max – F0 min). We additionally analyzed recordings in which we only had IDS, and these

caregivers had very similar measures. However, we did find that American mothers used marginally higher pitch than Kenyan and Fijian mothers, suggesting that IDS might be more exaggerated in the US. This is the first research systematically comparing spontaneous IDS and ADS in traditional societies, and is consistent with a large body of evidence showing universal patterns in IDS across industrialized populations. Implications for the evolution of prepared learning mechanisms in infants and a prepared 'teaching' mechanism in adults will be discussed.

**Fiona Jordan, M. Dunn, S. Beller & A. Bender.**

Counting coconuts for the chief: coevolution in language and culture.

Across the world, languages vary in their ways of enumeration. Some languages, but not others, have dedicated linguistic mechanisms for counting certain objects and/or large numbers. Numeral classifiers are words or affixes to nouns that are used for counting certain classes of objects, such as "animate things" or "coconuts". Specific counting systems go a step further and count specific classes of objects by units greater than one, such as (e.g.) pairs or twenties. Examining Oceanic languages, Bender and Beller have advanced the idea that numeral classifiers and specific counting systems are object-specific, refer to culturally-salient semantic domains, and are often used to enumerate large quantities. Here we test their hypothesis that these linguistic features may have co-evolved with aspects of socioecology, specifically, norms of redistribution such as chiefly tribute that are found in socially stratified societies. We have collected linguistic and cultural data for over 100 Austronesian ethnolinguistic groups, and, using lexical phylogenies of these languages as a model of population history, we use maximum likelihood and Bayesian comparative methods to (a) reconstruct the most likely model of history of counting systems and social structure and (b) test for causal co-evolutionary processes. Using phylogenetic approaches not only allows us to control for Galton's Problem but allows us to test these language-culture coevolutionary hypotheses in a framework that delivers estimates of the processes of cultural change. These results speak to broader issues regarding the flexibility of human numerical cognition, as well as shed light on the specific development of counting systems within the Austronesian cultural context.

#### **Session 44. Facial attractiveness 3. (*Antigone3*)**

**Urszula Marcinkowska, R. Burris, M. Fox, & Minna Lyons.**

Women fixate longer on feminine than masculine men's faces when judging for a long-term, but not a short-term, relationship.

**Introduction:** Previous research has demonstrated that women express different preferences for masculine and feminine male faces when making long-and short-term partner choices. It has been hypothesised that, in short-term mating, females seek genetic benefits from masculine males, and in long -term relationships, fathering abilities from males with more feminine features. The present study is investigating the eye-gaze of women when looking at computer-manipulated male faces, to determine how mating decisions are associated with visual scanning of faces. **Method:** Twenty five pairs of male faces (same identity, manipulated using computer graphics software to appear more masculine / more feminine) were presented side by side, in randomised order, to 40 women using the Eye-link 1000 eye-tracking device. In two blocks (each consisting of 25 trials lasting 4 seconds), women were asked to express a preference for one of the male faces as a long term (block 1) and short term (block 2) partner. We recorded total dwell time on each face, together with maximum and minimum pupil size per trial, and dwell time on four separate facial regions. **Results:** Preliminary analyses indicate that when evaluating males as short-term partners, total dwell time was not different between masculine and feminine faces. However, when making long-term mating decisions, women looked significantly more at the feminine than the masculine faces. Pupil dilation and dwell time on different parts of the face will also be reported. **Discussion:** Women attend to the faces of males with feminine facial characteristics longer than masculine faces, but only in the context of long-term mating decisions. This may be because the negative repercussions of choosing an unsuitable mate are more pronounced when women judge for a long-term relationship. The results will be discussed with reference to female partner choice in different relationship contexts.

**Antonio S. Silva, V. Lummaa, U. Müller, A. Mazur, M. Raymond & A. Alvergne.**

Do attractive people have more children? A cross-cultural study on facial attractiveness and reproductive success.

Evolutionary models of human mate choice generally assume that physical attractiveness is a sexually selected trait, i.e. associated with higher mating opportunities and subsequent reproductive success. However, few studies have tested whether attractiveness is (i) heritable and (ii) related to reproductive success (RS), key factors in informing the extent to which selection can operate on attractive traits in modern populations. In this study, the relationship between facial attractiveness and RS was investigated in two different socio-ecological settings: rural Senegal (73 men and 107 women) and the USA (35 men). The results show that facial attractiveness is not heritable and is not associated with either quantity and/or quality of offspring in Senegal, and negatively predicts the number of grandchildren in the U.S.A. This relationship is controlled for facial dominance, which positively predicts RS and is heritable, suggesting that facial dominance rather than facial attractiveness as a whole is a sexually selected trait. This study illustrates the relevance of testing key evolutionary assumptions using contemporary populations to understand the evolution of mate preferences for physical attractiveness.

**Lynda G. Boothroyd, J. Vukovic, R. Page, E. Meins, D.M. Burt & B.C. Jones**

Circum-pubertal effects of children's and adolescents' judgments of facial attractiveness.

Adults and children of all ages agree on which faces are in general more attractive. Facial attractiveness, however, may be a 'compound' trait in which multiple aspects of a given face contribute to its overall attractiveness and little is known about how preferences for specific traits develop across childhood. In the current study, we investigated children's and adolescents' preferences for averageness, symmetry, health, sexual dimorphism and attractiveness in adult faces. Participants aged from 3 to 18 years of age reported their preferences on matching stimuli. Initial results suggest that adrenal hormones released in the peri-pubertal stage may be responsible for activating some mate preferences.

**Petra Gyuris, F. Kocsor & T. Bereczkei**

Face preference in childhood and mate choice in adulthood.

Previous studies showed either that adults prefer long-term partners who are similar to themselves (homogamy) or who are similar to their opposite-sex parents (sexual imprinting-like mechanism). We intended to obtain a more detailed and elaborated picture about the two rival hypotheses of mate choice preferences: the process of homogamous mate choice and the process of sexual imprinting-like mechanism. The aim of our research was to determine the age, when the preference of own face and the preference of parents face develop in childhood, and to determine the temporal relation of these two processes. In our study photos were taken on family members: parents and their children between ages of 3 and 7 years. The shape of these individual faces was applied in 50% onto a composite face constructed of nursery-school children. The children were asked to take a sympathy choice in different experimental arrangements (i.e. own face vs. same/ opposite sex parent's face or an unknown control face). Our research has shown surprising results: the nursery- school children neither preferred their parents' nor their own manipulated faces in the different experimental arrangements. The lack of the expected preference might be explained by assuming that the cognitive processes which are necessary to detect resemblances, and hence later in adulthood could influence mate choice preferences, have not yet been developed in this age. However, our study is the first to investigate the development of childrens' face preferences in relation to sexual imprinting theory.

#### **Session 45. Relationship damage and repair. (*Pasteur*)**

**Eric Schniter, R. Sheremeta & D. Sznycer**

Rebuilding damaged trust with apology, promises, and atonement.

Adaptive theories of trust based reciprocity predict that individuals will regulate tradeoffs between self and others' welfare based on their expectations of others' propensity to reciprocate. That is, others' demonstrable trustworthiness should modulate one's willingness to take on immediate vulnerability by investing resources in them with expectation of net gains from their subsequent reciprocation. In turn, this would have selected for adaptations for broadcasting cues of trustworthiness, concealing cues of untrustworthiness, and restoring trustworthiness following damage to others' trust. Opportunities for mutual gains often exist before offenders can demonstrate their dependability. Therefore, mechanisms for restoring trustworthiness under conditions of

damaged trust are expected. Signals to the victim conveying acknowledgment of harm and/or increased social valuation—apologies—qualify as one possible mechanism for rebuilding damaged trust. Victims who are offered an apology and promise of intended atonement face a choice dilemma between (1) being persuaded but possibly misled by these signals (which have weaker cue validity than demonstrated reciprocation and atonement) and (2) foregoing mutual benefits. To study how apology and signals of intended atonement can rebuild damaged trust, we designed an experiment in which paired subjects participated in two consecutive trust games. In these games, (1) trustees made a non-binding promise, then (2) investors decided whether to invest, and finally (3) trustees decided how much income to return. After a second (surprise) game –identical to the first—was announced, but before it commenced, trustees were given an option to send a one-way ad libitum message (e.g., to issue an apology). Evolutionary theory argues that apologies should have evolved only if they were veridical, at least on average. If apologies and promises are reliable signals of increased welfare tradeoff ratios, we expect to see evidence for this. We found that in the first game most promises were for near equal splits of income, most investors invested, and on average, investments paid off, although 20% of trustees broke promises. Untrusted trustees used messaging and more egalitarian promises for persuasion. Promise keepers from the first game made similar promises in the second game. Promise breakers successfully used apology and larger new promises to rebuild broken trust. Two thirds of promise breakers who were re-trusted broke promises again. Interestingly, these repeat promise breakers reported significantly less guilt after the first game. Expressions of emotion that are available in face-to-face interactions might reveal mediating emotions (like guilt) and increase cue validity for apologies and promises.

#### **Jodie L. Burchell & R. Wilkinson**

##### **Better together: the role of hurt feelings in maintaining relational closeness.**

Hurt feelings are caused when a relational partner communicates, through an act, that they don't value the relationship as much as the victim assumed. The psychological pain caused by hurt feelings acts as a motivation to rectify any perceived damage to the relationship. Research suggests that when a victim evaluates a hurtful act, they perceive two implications: the relationship may be in danger of being dissolved or downgraded; and the rewards associated with the current level of relational closeness will no longer be provided. The current study assesses whether concern over the loss of relational inclusion as well as loss of relational rewards are distinct causes of hurt feelings. The study used a self-report questionnaire methodology with 364 female adult participants ( $M_{age} = 33.65$  years,  $SD_{age} = 11.17$  years). The intention was to include both male and female participants in this study; however, this was not possible due to insufficient numbers of male respondents. Participants read 6 stories about hurtful incidents, and rated the intensity of hurt they would feel if this incident happened to them. The content of these 6 stories was manipulated according to two conditions in a  $2 \times 3$  design. Firstly, the threat of relationship dissolution implied by the hurtful event was manipulated by the degree of rejection that the event conveyed (2 levels: high rejection and low rejection). Secondly, the threat of loss of rewards associated with the relationship was manipulated by the degree of closeness of the relationship the incident occurred within (3 levels: romantic partner, close friend and acquaintance; with the highest level of closeness being romantic partner, and the lowest level of closeness being acquaintance). The results indicated a significant main effect for rejection type, with high rejection incidents associated with higher hurt than low rejection incidents ( $F(1, 726) = 1104.47, p < .001, \eta^2=.60$ ). Moreover, there was a significant main effect for relationship closeness, with higher levels of relational closeness associated with higher levels of hurt ( $F(1.96, 1419.21) = 424.22, p < .001, \eta^2=.37$ ). Finally, there was a significant interaction between the rejection and relational closeness conditions ( $F(1.96, 1419.21) = 40.56, p < .001, \eta^2=.05$ ). Together, these results suggest that threats of relationship dissolution and anticipated loss of relationship rewards both predict the intensity of hurt feelings. These findings are consistent with past evolutionary psychological research suggesting a central role of group membership and social bonds in human mental processes.

#### **Theresa Robertson, A. Delton, D. Snycer, J. Lim, J. Tooby & L. Cosmides**

##### **Social exclusion as a cue to social value.**

When an individual is excluded by a social group, they lose the help and support of that group (and may even be exploited by it). But what sort of treatment should they expect from others outside the excluding group? We propose that social exclusion can act as a cue to social valuation: all else equal, seeing that a person has been excluded is a cue that the person now has lower social value. Thus, the minds of excluded people may anticipate that others—even those not part of the excluding group—will place less weight on their welfare. We test this

experimentally: First, excluded people expected their excluders to value them less. Second, and more telling for the exclusion-as-cue hypothesis, they also expected uninvolved third-party observers of their exclusion to value them less. These results may help explain why excluded people often behave aggressively, even towards people uninvolved in their exclusion: In past environments, people may have had little choice but to “enforce” higher levels of valuation when they were not valued intrinsically.

#### **Daniel Sznycer, J. Tooby & L. Cosmides**

The grammar of disgrace: The psychology of shame is domain-specific and closely tracks the psychology of social valuation.

Being valued by others is an important source of fitness benefits, and a drop in social value entails major fitness costs. This adaptive problem would have selected for adaptations for limiting the likelihood and the costs of being socially devalued. We have proposed that human shame is one such adaptation. Here we report further tests of this regulatory theory of shame. The tests were conducted with two versions of a set of hypothetical scenarios. The first version placed participants in the role of audience and assessed degree of devaluation. The second version placed other participants in the role of discredited individual and assessed intensity of shame. To be effective, shame should be activated most intensely by events that elicit the most devaluation from others. Indeed, across situations, shame intensity was highly correlated with degree of devaluation. This involved more than a simple distinction between presence and absence of discrediting cues, as shame tracked devaluation even among the subset of discrediting situations. The fact that shame tracks devaluation raises the question: What is the structure of social valuation? Evolutionary theory suggests that the factors of social value are many and domain-specific. In the domain of welfare tradeoffs, for instance, selfishness is expected to cause more victim devaluation and more offender shame when the victim incurs high costs and when the offender derives few benefits—both cues that the offender places insufficient weight on the welfare of the victim. In the domain of skills, devaluation and shame should be higher for failure at easy tasks than for failure at difficult tasks since the former implies more incompetence than the latter. These predictions were empirically supported, suggesting that a common grammar of social value informs both devaluation and shame. Moreover, the intensity of shame appears to be determined not only by the particular level of value afforded by a given situational constituent but also by the role of that constituent in the “syntax” of a global situation. For example, having a massive inflammatory rash elicits more shame than having a minor inflammation. However, stealing a medication to treat a massive inflammatory rash yields less shame than stealing a medication to treat a minor inflammation. In sum, shame appears to match social devaluation like a key fits its lock.

18.30: 19.30: Late afternoon sessions 46-48

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#### **Session 46. Effects of pathogen pressure. (*Antigone3*)**

##### **Mark Schaller, A. Beall & D. Murray**

Pathogen threat and its implications for mate preferences.

Infectious diseases imposed selection pressures on ancestral populations, resulting in the evolution of psychological mechanisms that facilitate behavioral responses minimizing that risk. These risk-averse responses are calibrated to individuals' own vulnerability to infection: They are especially strong when individuals perceive themselves to be especially vulnerable to infection. Several previous studies have documented implications of this adaptive logic for sexual attitudes, sexual behavior and facial preferences (Little et al., 2011; Schaller & Murray, 2008; Tybur et al., 2011). We report 2 studies that extend this analysis specifically to the topic of mate preferences. Study 1: Subjective assessments of another person's attractiveness provides information connoting that person's resistance to infectious disease, and also the disease-resistance (and reproductive fitness) of offspring produced by that person. It follows that when pathogen threat is salient, people will show an especially strong preference for subjectively attractive mates. This hypothesis has been supported by a cross-national correlation between pathogen prevalence and the normative importance placed on physical attractiveness (Gangestad & Buss, 1993), but the causal hypothesis has not been rigorously tested with experimental methods. Study 1 (N = 276) did so. Salience of pathogen threat was experimentally manipulated, and participants then rated 10 opposite-sex faces (attractive and unattractive) on their desirability as short-term mates and long-term mates. Results support the hypothesis: When pathogen threat was salient, people showed exaggerated preference for attractive (compared to unattractive) mates. This effect was especially strong in ratings of long-

term mates. Study 2: An individual's risk of infection is influenced by the past sexual behavior of a mate: More promiscuous mates increase one's own risk of infection. It follows that when pathogen threat is salient, people will show a stronger preference for less promiscuous mates. Study 2 ( $N = 143$ ) tested this hypothesis. The salience of pathogen threat was experimentally manipulated, and participants then completed measures assessing characteristics of ideal long-term mates. Results partially support the hypothesis, and also document a sex difference: When pathogen threat was highly salient, women (but not men) preferred mates with fewer prior sexual partners, and also placed a higher value on the virginity of a mate.

#### **Takeshi Hamamura & J. Park**

A cross-cultural analysis of defensive reactions to the “swine flu” outbreak from the perspective of pathogen prevalence.

Outbreak of the “swine flu” in 2009 triggered different reactions worldwide: some societies adopted more defensive reactions than others. What may explain such difference? Recent research has found that contagion-minimizing behavioral tendencies (e.g., avoiding contacts with foreigners) are amplified in historically pathogen-prevalent regions. We investigated whether reactions to the “swine flu” outbreak of 2009 were stronger among East Asians than Westerners, populations residing in regions that now enjoy comparable advances in healthcare but that are characterized by relatively high and low historical pathogen prevalence, respectively. In a survey, East Asians reported greater concerns about infection especially from foreigners. Analyses of international air travel data around the time of the outbreak provided corroborating evidence: Airports in the Asia-Pacific region lost more international traffic relative to their Western counterparts, and East Asian airlines reported greater declines in international traffic compared to Western airlines. These differences are unlikely to reflect direct reactions to contemporary conditions rather, they suggest the influence of past pathogen prevalence on behavioral patterns forged and sustained via cultural transmission.

#### **Randy Thornhill & Corey Fincher**

Parasite stress promotes homicide and child maltreatment.

Researchers using the parasite-stress theory of human values have discovered many cross-cultural behavioral patterns that inform a range of scholarly disciplines. Here we apply the theory to major categories of interpersonal violence, and the empirical findings are supportive. We hypothesize that the collectivism evoked by high parasite stress, as well as parasite stress itself, are causes of adult-on-adult interpersonal violence. As predicted, across the U.S. states, parasite stress and collectivism each positively correlate with rates of men's and women's slaying of a romantic partner, as well as the rate of male-honor homicide and of the motivationally similar felony-related homicide. Of these four types of homicide, wealth inequality has an independent effect only on rates of male-honor and felony-related homicide. Parasite stress and collectivism also positively predict cross-national homicide rates. Child maltreatment by caretakers is caused, in part, by divestment in offspring of low phenotypic quality, and high parasite stress produces more such offspring than low parasite stress. Consistent with this, rates of each of two categories of the child maltreatment—lethal and non-lethal—across the U.S. states are predicted positively by parasite stress, with wealth inequality and collectivism having limited effects. Parasite stress may be the strongest predictor of interpersonal violence to date.

### **Session 47. Female competition and aggression. (Pasteur)**

#### **Jessica Yaeger, Sara Margolius & Joyce F. Benenson**

Explaining the disconnection between anger and aggression in women.

It is well-established that human males are more violent than females (Daly & Wilson, 1999; Maccoby & Jacklin, 1974). Campbell (1999) argues that women shun physical aggression because they bear greater responsibility than men for gestation, lactation, and raising children, and engagement in physical aggression could jeopardize women's reproductive success. Consequently, women exhibit proximately higher levels of fearfulness than men which leads to avoidance of physical aggression. Research demonstrates however that in response to provocation at all ages, human females become equally or more angry than males (Potegal & Archer, 2004). How then do women cope with their anger? This research explored two possibilities. The first possibility is that women use a different form of aggression than men. Research using a computerized game shows that women use social exclusion more than men (Benenson, Markovits, Emery Thompson, & Wrangham, 2011) which fits with women's

lesser reliance on cooperation with same-sex peers. The second possibility is that sex differences in physical violence will be less likely if physical injury is impossible. To explore these two possibilities, 74 women and men were insulted or served as controls. Systolic blood pressure and facial expression of negativity were used to measure anger; strength of hand grip squeeze and number of presses on a space bar in order to cause a computerized balloon to explode measured physical violence; and monetary donations to exclude the insulting party measured social exclusion. An analysis of variance (ANOVA) with condition and sex as the independent variables was conducted on all measures. Results showed that females in the experimental group exhibited higher systolic blood pressure than females in the control group, whereas males in the control group exhibited higher blood pressure than males in the experimental group,  $F(1,54)=4.65$ ,  $P<.04$ . An ANOVA on strength of hand grip showed that males squeezed harder than females,  $F(1,60)=14.08$ ,  $P<.001$ , and the experimental group squeezed more tightly than the control group,  $F(1,60)=4.29$ ,  $P<.05$ . An ANOVA on reaction time to cause the balloon explosion showed that the experimental group pressed faster than the control group,  $F(1, 51)=6.50$ ,  $P<.02$ . Finally, females in the experimental group donated more money to exclude the party that insulted them than females in control group, whereas males showed the opposite effect,  $F(1,61)=4.61$ ,  $P<.05$ . These results provide support for the ideas that females translate anger into violence as long as physical injury is minimized and uniquely rely on social exclusion.

#### **Elise Huchard & G. Cowlishaw**

Female-female aggression around mating: an extra cost of sociality in a multimale primate society.  
Multimale-mulfemal groups, where both sexes mate promiscuously and the operational sex-ratio is male-biased, represent a classical mammalian society. Theory predicts low mating competition between females in such societies, but this is inconsistent with the frequent occurrence of female sexual signals. This study explores the determinants of female competition under such conditions by testing three hypotheses relating to patterns of aggression over the reproductive cycle in wild chacma baboons (*Papio ursinus*). Primarily, we expect the frequency of aggression to be highest among (i) lactating and pregnant females, who experience the greatest energetic demands, if females compete mainly over food, (ii) lactating females, if females compete mainly over paternal care of infants, or (iii) sexually active (swollen) females, if females compete mainly over mates. Data were collected from 27 females in two groups over 18 months, and analysed using mixed models. Our results provide most support for the mating competition hypothesis: aggression increases with the number of swollen females in a group, swollen females receive the most aggression, and mate-guarded swollen females receive more aggression than when unguarded. However, our analyses further indicate that such aggression, rather than arising from direct mating competition, most likely reflects reproductive suppression and/or an increased exposure of swollen females to incidental aggression. These findings reveal the importance of sex in shaping social relationships among females in large primate groups where they were traditionally considered to be determined primarily by access to resources. Aggression associated with access to mates represents an extra cost of sociality to females.

#### **Ruth Mace & A. Alvergne**

##### **Female female competition in rural Gambian households.**

Many studies have indicated that the extended family can be helpful in raising offspring, including our own studies on a rural Gambian population, showing that maternal grandmothers and older sisters can be help the survival of offspring (Sear and Mace 2000,2002,2008). However less attention has been given to the extent to which female kin or co-residents in households might compete with each other. It has been argued that competition between generations may underpin the separation of human generations and possibly explain the evolution of menopause (Cant and Johnstone 2008). Here we seek evidence for female competition in a rural Gambian population. We find a small effect of competition between reproductive age women living in the same compound as indicated by the total number of reproductive age women in the compound. We also seek evidence for direct competition between mothers and daughters and mothers and daughters-in-law. Because menopause exists, it has the effect of minimising overlap in reproductive age mothers and grandmothers. However there were several mothers who became grandmothers before the age of menopause, and we were able to show that having a grandchild causes a significant reduction in their reproductive rate. This is evidence of competition between mothers and grandmothers as predicted by the theory that menopause evolved to reduce reproductive conflict.

## **Session 48. Enforcement of cooperation? (Rondelet)**

**Nobuyuki Takahashi, M. Inaba & H. Nakagawa.**

Comparison of four types of sanctioning mechanism.

Although the second-order problem has not been solved theoretically, a number of empirical studies have focused on sanctioning as a solution to social dilemma (SD) and found that many people voluntarily engage in sanctioning. There are various types of sanctioning mechanism, however, and each of the previous studies typically focused on only one or two types of sanctioning. For example, Yamagishi (1986) used a sanctioning system to which participants decided whether or not to contribute, while Fehr and Gachter (2002) used an individual sanctioning mechanism in which each participant individually decided whether or not to punish a defector. Furthermore, most of the previous studies examined punishment only, while only a few studies examined reward. Thus, the current study is the first endeavor to systematically examine sanctioning behaviors across various types of sanctioning. We conducted a repeated SD game with a sanctioning stage. We used a 2 by 2 between-subjects factorial design. Independent variables were (1) sanctioning entity (sanctioning by individuals or a system) and (2) sanction method (reward or punishment). There were two hypotheses. (1) Participants should use sanctioning more in the reward conditions than in the punishment conditions. (2) Participants should use sanctioning more in the system conditions than in the individual conditions because legitimacy of sanctioning by a system is higher than that by individuals. The results indicate that only hypothesis (1) was supported. The main effect of sanction method was significant, suggesting that participants used reward more than punishment. On the contrary, hypothesis (2) was not supported. The main effect of sanctioning entity was not significant, and there was no interaction effect. Thus, whether sanctioning is conducted by a system or individuals did not matter. The other interesting finding is that the main effect of sanctioning entity on cooperation rates was significant. Participants in the individual sanctioning conditions cooperated more in SD than those in the system sanctioning conditions. The implication of this finding combined with the main effect of sanctioning method is that the most efficient sanctioning mechanism turns out to be individual punishment. Finally, responses to the post-experimental questionnaire suggest that reputation of rewarders was much higher than that of punishers. Furthermore, completely opposite to the expectation, legitimacy was higher in the individual conditions than in the system conditions. The reason behind this observation remains a puzzle.

**Andrew Delton, J. Nemirov, T. Robertson, A. Cimino & L. Cosmides**

Obligated to contribute? The effects of excludability on obligations in collective action.

Humans everywhere engage in collective action: multiple individuals coordinate to produce a shared good that none could produce alone. Collective actions differ, however, in whether non-contributors can be excluded from them. In a series of experimental studies we show that, when collective actions lack excludability, it creates obligations to contribute—even among those individuals not actively taking any collective benefits. In other words, for non-excludable collective actions, individuals who are only potential—not just actual—beneficiaries are nonetheless obligated to contribute. This pattern, moreover, appears inconsistent with ontogenetic payoff maximization; instead, it appears to follow an evolved logic.

**Max Krasnow, A. Delton, J. Tooby & L. Cosmides**

What second-order free rider problem?

Research into the evolutionary dynamics of collective actions—often modeled as a public goods game—has uncovered a seemingly insurmountable problem. Free riders (individuals who benefit from the public good but do not pay to provision it) destabilize contribution and cause it to collapse. If free-riders are punished, however, and their future investment in the public good induced, both behavioral data and simulation analyses suggest that contributing strategies can be stable against invasion by free-riding strategies. This solution is not unproblematic, however. In an ecology where individuals are locked into life-long stable groups, the resultant benefits of the free-rider's recruited labor are unavoidably shared by both punitive and non-punitive strategies. As the punitive strategies uniquely pay the cost of punishment, non-punitive strategies (second-order) free ride on their labor recruitment efforts. Therefore, in this ecology non-punitive strategies can destabilize punishment, causing both it and the original contribution to collapse. Indeed, no n-order recursively punitive strategy—e.g., punishing free riders and those who don't punish free riders—is stable against exploitation by a non-punitive n+1-order strategy. If punishment cannot evolve, and contribution to collective actions cannot therefore be stabilized, how can we explain the behavioral prevalence of both behaviors in modern humans? However, is such

an ecology the ancestrally realistic case? Unlike this previous characterization, human collective actions are often spontaneous responses to opportunity, flexible in membership, and temporary. In this research we present a solution to the second-order free rider problem that is as simple as correcting this ecological assumption. We show that by relaxing the assumption of lifelong group stability, the benefits of recruited labor differentially flow to the individual punisher, eliminating the second-order free rider problem and causing both punishment and contribution to reliably evolve.

## SUNDAY, JULY 3<sup>rd</sup>

9.00-10.00: Plenary 6

**Frank Marlowe - Florida State University, USA.**

Adaptively relevant environments.

In 1998 Bill Irons proposed the term 'Adaptively Relevant Environments' (ARE) to replace 'the Environment of Evolutionary Adaptedness' (EEA), which had taken on several misconceptions. Humans have some adaptations that began to evolve hundreds of millions of years ago; others are so recent they are not even human universals. After reviewing Irons' points about the ARE, I analyze data on hunter-gatherers in the ethnographic record to reconstruct the likely environments that favoured certain of our traits. Some have argued that the hunter-gatherers described were those in marginal habitats not yet taken over by agriculturalists, hence a biased, misleading sample. In the only test of this hypothesis we found that the habitat productivity of hunter-gatherers is not lower than that of agriculturalists. Arctic foragers are very different but arctic habitats have only been occupied a few thousand years. To get the most relevant sample for a long period into the past I use warm-climate (Effective Temperature  $\geq 13^{\circ}\text{C}$ ), non-equestrian foragers ( $n = 183$ ). They typically lived in camps of 25-30 individuals which moved about 7-10 times a year within a large area occupied by the total ethno-linguistic population of 500-1000. They were surprisingly egalitarian because they were free to choose where to live -- with wife's kin, husband's kin, both or neither. They had a sexual division of foraging labour and ate a diet consisting of about 55% gathered foods, 25% hunted animals, and 15% fish, with males contributing about 53% to females' 47% of the total. By 2.5 mya technology made surplus food acquisition possible, which led to central place provisioning, and widespread food sharing. This may account for early Homo females getting larger, thereby reducing the degree of sexual dimorphism. Females were able to feed themselves but food acquired from males could be used to feed offspring and other kin, or just allocated to extra body fat and shortened birth intervals. Selection favoured females who were continually sexually receptive and attractive to males, giving such females greater mate choice. Menopause and extended estrus had profound consequences on male-male competition and mate-bonds. As we go further back in time we must subtract technologies and consider the likely effects: e.g., before bows and arrows, more group hunting; before spears, less meat; before the digging stick, perhaps not even a hominin.

10.00-11.20: Morning sessions 49-51

### Session 49. Adaptation or byproduct? (*Antigone3*)

**Guy Taylor-Covill & Frank Eves**

Does what we need influence what we see? Implicit energy demands affect our perception of a locomotor challenge.

Survival dictates that energy expenditure should not exceed energy intake. When animals climb, they must lift their body weight against gravity, making it a particularly resource hungry behaviour. Consistent with minimisation of energy costs, climbing appears to be avoided by mammals. This has been shown in elephants (Wall et al, 2006), orangutans (Thorpe et al, 2007) and humans (Eves, in press). Proffitt, (2006) argues that an implicit process that perceives the resource consequences of a given behaviour rescales explicit reality to match available resources. Such a link between implicit knowledge of available resources and explicit perception of the environment would have survival value. Bhalla and Proffitt (1999) depleted locomotor resources by encumbering participants with a heavy backpack or sending them on an exhausting run. Reports of the steepness of hills increased in line with the reduction in available locomotor resources. More recently, Schnall et al (2010) increased available resources by having participants consume a sugary drink, while a control group consumed a

drink that contained artificial sweetener. Reports of hill steepness were lower in participants whose blood glucose levels had been boosted after the consumption of a sugary drink. In this study, we tested whether slope estimates were affected by available resources in the natural environment. Stair climbing is energetically costly, requiring 9.6 times the energy expenditure of the resting state. Participants (n=216) estimated the slope of 6.45m high staircase (23.7°) at Snow Hill Station, Birmingham (UK). Following perceptual judgments, participants were offered a selection of fruit and drinks differing in glucose content 'as a thank you for taking part'. Essentially, this allowed participants the opportunity to replenish their energy resources by, for example, opting for a high glucose drink. Analyses revealed the individuals that chose the higher glucose items reported the staircase as steeper ( $M=+5.4^\circ$ ) than those choosing the low glucose option. In addition, those, opting for the more rapidly available energy provided by a drink rather than fruit also reported the staircase as steeper ( $M=+5.3^\circ$ ). The effects remained significant when age, gender and reported stair climbing effort - variables that all influence slope perception - were included in analyses. These results indicate that implicit knowledge of our available resources influences our perception of a locomotor challenge. Discussion focuses on how perception of the environment may affect locomotor choices and the possible implications of this process on the long-term health of individuals living in the modern, built environment.

**Mark van Vugt & V. Griskevicius**

**Human-Nature: the evolutionary psychology of environmental sustainability.**

Many scholars and policy makers agree that humans must reduce their environmental impact and adopt a more sustainable lifestyle. Yet people have been slow to respond, and interventions aimed at changing current environmental practices have not been terribly successful. We propose that society could better preserve nature through an improved understanding of human nature. Evolutionary approaches to sustainability suggest that environmental problems are often caused or exacerbated by: (1) human propensity for self-interest, (2) human proclivity to be short-sighted, (3) human tendency to be motivated by relative status, (4) human predisposition to copy others, and (5) important mismatches between modern and ancestral environments. We present evidence for each of these claims by drawing upon extant research in such diverse areas as social dilemmas, temporal discounting, conspicuous consumption, social norms and biophilia with a particular focus on recent findings from our own research programs. By considering how and why deep ancestral forces continue to shape modern environmental behaviors, we present ways that human nature can be harnessed to create better intervention strategies to lessen resource depletion, restrain wasteful consumption, curb overpopulation and spur sustainable behaviors. Literature Griskevicius, V., Tybur, J. M., Sundie, J. M., Cialdini, R. B., Miller, G. F., & Kenrick, D. T. (2007). Blatant benevolence and conspicuous consumption: When romantic motives elicit strategic costly signals. *Journal of Personality and Social Psychology*, 93, 85-102. Van Vugt, M. (2009). Averting the tragedy of the commons: Using social psychological science to protect the environment. *Current Directions in Psychological Science*, 18, 169-173.

**Diane Ormsby, J. Haywood, P. Lester & B. Dixson.**

**Does ambient temperature predict fluctuations in birth sex ratio in New Zealand?**

Trivers and Willard's theory of sex allocation in mammals predicts that females in better condition will produce a higher Secondary Sex Ratio (SSR: the ratio of males born: total births) than females in poorer condition. Numerous social, economic and environmental factors have been linked to fluctuation in the human SSR. Among these traits, ambient temperature has been shown to be positively associated with the SSR. Thus, within countries which experience seasonal variation in ambient temperature, more males have been shown to be born in warmer years and in warmer seasons. New Zealand (NZ) is comprised of a North and South Island (spanning latitude 34° S to 46 °S), which experience quite significant changes in ambient temperature throughout the year. Using historical demographic vital statistics, national climate data and detailed time-series analyses, we examined three hypotheses testing for effects of ambient temperature on the human SSR. Firstly, using historical annual data spanning 1876-2009, we found that while the proportion of males born ranged by 3.115%, from 0.504 to 0.520, there was no significant relationship between sex ratio and ambient temperature in the concurrent or previous years. Secondly, we examined whether changes in annual ambient temperature are negatively related to the sex ratio of stillbirths from 1929-2009 and whether the stillbirth sex ratio is negatively related to the SSR. We found no evidence that fewer male stillbirths occurred during warmer concurrent or previous years, though a declining trend in the stillbirth sex ratio was observed throughout the data. Thirdly, we tested whether seasonal ambient temperatures, or deviations from those seasonal patterns, were positively related to the SSR using

monthly data from 1980-2009. Patterns of male and female births were found to be seasonal; however, they were very similar throughout the year, resulting in a non-seasonal SSR. Results showed, across all hypotheses under examination, that fluctuations in ambient temperatures were not related to the SSR or the stillbirth sex ratio in New Zealand. These findings will be discussed and contrasted with other recent work, which has shown a positive relationship between ambient temperature and SSR. We conclude there is no universal rule concerning the effects of temperature on human SSR.

**Andrew Lewis & M. Galbally.**

An evolutionary mismatch in infant development: the contradiction between Western practices of breast feeding and infant sleep patterns.

Evolutionary ideas can enhance the understanding of contemporary health problems when we can identify a mismatch between contemporary lifestyles and the evolved biological requirements which are the product of natural selection. This is particularly applicable to understanding the developmental needs of human infants. Western countries have seen major declines in breastfeeding rates which typically range between 20-40% by 6 months of age and parents also go to considerable lengths to encourage their infants to sleep overnight. An evolutionary perspective can be applied to understanding the interaction of different sleep/wake cycles and the nocturnal feeding needs of breastfed infants. Using data from the first wave of Longitudinal Study of Australian Children we examined the association of breast feeding with infant waking, within a sample of n= 4443 mother-infant pairs. Mothers were asked to rate sleeping problems which occurred 4 or more nights per week. Binary logistic regression, controlling for a range of potentially confounding factors, suggested that continuation of breast feeding at 6 months of age was associated with a greater likelihood of what parents identified as a 'problem' with infant waking and difficulty sleeping alone, but otherwise a range of improved infant health outcomes. These findings are discussed from an evolutionary-developmental perspective in terms of heterochronic shifts in the timing of human gestation and the co-evolution of parental investment and infant care solicitation strategies in humans. The need for co-sleeping and breast feeding are components of the evolved biology of the mother-infant infant relationship which regulate the infant's nutritional, socio-emotional and hormonal interactions with its mother.

**Session 50. Polygamy and monogamy. (*Pasteur*)**

**Daniel Kruger, J. Clark & S. Vanas**

The operational sex ratio influences birth outcomes in modern human populations.

Maternal somatic investment in gestating offspring may be shaped local environmental conditions. Features indicating relatively high extrinsic mortality rates, relatively low paternal investment, and the unpredictability of future outcomes may be associated with relatively faster life history strategies, including shifts in the balance of investment between offspring quantity and quality. Anthropologists have successfully used life history models to understand reproductive outcomes in foraging populations. The co-varying factors of prematurity and low birth weight are the primary cause of infant mortality in developed countries. Reproductive dynamics are influenced by the relative proportions of potentially reproductive males and females in a population. Because the reproductive strategies of men and women are somewhat divergent, influences of the Operational Sex Ratio on the intensity of mating competition and selectivity for partners produce different outcomes in female biased and male biased populations. Male mating opportunities are enhanced by scarcity and incentives for long-term commitment are diminished, encouraging serial and simultaneous polygyny. Scarce females may be able to more effectively secure commitment from partners as well as demand higher levels of resource investment. Imbalanced sex ratios are associated with largely consistent social and cultural trends in specific historical periods and populations. We predicted that women in female-biased populations may shift towards a quantitative reproductive strategy due to the reduced prevalence of paternal investment. We combined aggregated birth records with U.S. Decennial Census data. Across counties in the USA, greater proportions of women in the population are associated with higher incidence of low birth weight and pre-mature gestation. These relationships were replicated even when controlling for the median household income and the proportions of the population which are: Below the poverty line, High School graduates, four year college graduates, and African American. The proportion of families headed by single mothers partially mediated the relationships between the sex ratio and birth outcomes. Our results demonstrate that evolutionary Life History Theory is a powerful framework for understanding variation in life strategies as evolved functional adaptation to environmental

conditions. Adverse birth outcomes may partially result from mechanisms evaluating environmental conditions and regulating investment trade-offs evolving when mortality rates were much higher and environmental features relevant to survival and reproduction were much less reliable than in modern societies. Mechanisms that facilitated reproductive success in ancestral environments may not lead to ideal health outcomes in modern urban environments. Interventions promoting desirable birth may be more effective by attending to environmental influences.

**Kathrine Starkweather & R. Hames**

A survey of non-classical polyandry.

Polyandry is a form of marriage in which one woman is married to more than one man, and has been reported throughout the anthropological literature to only occur in 4 societies worldwide. A classical form of polyandry has been observed in Tibet and parts of India and has been misrepresented by scholars as the sole form polyandry takes. We have identified a sample of 53 societies that permit polyandrous unions outside of the classical area of Tibet and India. Our goal is to describe social and other characteristics of these societies and to evaluate some hypotheses of the causes of polyandry. In addition, we demonstrate that although polyandry is rare, it is not a rare as commonly believed, is found worldwide, and is most common among egalitarian societies. Our analysis reveals that it may be a predictable response to a high operational sex ratio favoring males and may also be a response to high rates of male absenteeism. Other factors may contribute but our within polyandry sample limits our analysis.

**Elisabeth Oberzaucher & Karl Grammer**

The case of Moulay Ismael the Bloodthirsty: fact or fancy?

Textbooks on evolutionary psychology and biology cite the case of Moulay Ismael the Bloodthirsty (1672-1727), who was supposed to have sired 888 children. It can be assumed that he had a fertile period of about 30 to 50 years. This example for male reproduction has lead to a controversial discussion in evolutionary psychology. In general the discussion is characterized by assumptions about reproductive constraints, which cannot be tested directly and are partly based on arbitrary figures. In a computer simulation we tested, how many copulations were necessary to sire 888 children. The algorithm consists of Wilcoxon-Weinberg model of conception and a Bayesian Network for the implementation of social and biological constraints. In the first model we used a random mating pool. In the second model we used a restricted harem pool. The results indicate that Moulay Ismael could realistically have achieved his legendary reproductive success.

**Andrew T. Hendrickson, J.D. Fortenberry & P.M. Todd**

Predicting cases of multiple sexual partners with simple mate choice strategies.

The search for and choice of potential mates involves multiple decisions over time that must be made in the face of environmental uncertainty and potentially involving multiple factors that change in importance. This work begins to test the predictions of existing models of cognitive mate search in a longitudinal data set and identify the consistent patterns of mate choice search that underlie adolescent sexual activity as a search process through time. In this work we focus primarily on the decision to have multiple sexual partners in a short amount of time. This behavior is particularly risky in regards to negative health outcomes but is predicted by many existing models of mate search due to the potential adaptive advantage. Instances of multiple sexual partners can be broken down into two classes dependent on which sexual relationship lasts longer. If the second relationship ends earlier than the first, this is consistent with mate choice strategies that involve Extra-Pair Copulation as a search strategy that may increase fitness of children. If the second relationship continues longer than the first, this is consistent with search strategies that predict Mate Switching as a method of finding a best-fit mate. To test the predictions of these classes of mate choice strategy, we looked at 253 instances from 97 subjects of multiple sexual partners within a 21 day window in the data from the Young Women's Project: daily diary entries from 387 young women outlining their romantic and sexual interactions with partners for up to eight years (Brown, et al., 2005). Subjects contributed 186,834 total diary days and a partner (sexual or non) was listed on over 93% of diary entries. For all multi-partner instances the characteristics of each partner were compared to characteristics indicated as "ideal" by each subject as well as classified based on the proposed "good genes" vs. "good dad" characteristics of Extra-Pair Copulations. Extra-Pair Copulation and Mate Switching show marked differences in many aspects including both relationship dynamics leading up to the multiple-partner event, the relative match of both partners to the self-described ideal partner, and location in ovulatory cycle. Additionally, for subjects with more than one

multiple-partner event we find consistent patterns in the type of multiple-partner event a subject engages in, suggesting that the mate search strategies they are using may be consistent across time.

### **Session 51. Prosocial behaviour. (*Rondelet*)**

**Peter Descioli & S. Krishna.**

**Giving to whom? Altruism in different types of relationships.**

Experiments show that people often give money away to other people, even when contributions are anonymous. These findings contradict the standard assumption in economics that people seek to maximize their own payoffs. Here we take the approach that human altruism is shaped by a set of evolved cognitive models for distinct types of relationships. Specifically, we apply Relational Models Theory which distinguishes between communal relationships based on mutual care, authority relationships based on power, and exchange relationships based on trade. In a series of experiments, we test whether Relational Models Theory can explain altruistic behavior in variants of the Dictator Game, a standard method for observing altruism. We subtly manipulate relationship context by varying hypothetical descriptions of the Dictator Game, while holding real monetary incentives constant. We find that relationship context, even when hypothetical, strongly affects altruistic behavior—modal offers range from 0% to 100%—and Relational Models Theory correctly predicts these effects.

**Jean-Baptiste André & N. Baumard**

**Equilibrium selection and human cooperation: the evolution of fairness.**

The evolutionary foundations of fairness is one of the most hotly debated questions in evolutionary anthropology. Reciprocate cooperation (in a large sense) generates collective benefits and, beyond explaining its mere existence, it is also essential to understand how evolution has shaped the way these benefits are divided. Fairness is the fact that, among the many ways to distribute collective benefits, we tend to favor impartial distributions and request our partners to do the same (e.g. 50/50 divisions in symmetric interactions). The evolution of fairness raises a particularly difficult question for theoreticians, as it actually entails dealing with the so-called issue of “equilibrium selection”. The principle of reciprocity per se is underdetermined (this is known in game theory as the “folk theorem”), which fundamentally stems from the fact that a very wide range of cooperative agreements are better than being alone. Influential authors have thus claimed that this problem is actually so difficult that it requires, almost unavoidably, the operation of some form of group selection [1]. Here, we offer an alternative solution. We show that the indeterminacy of reciprocate cooperation vanishes if one considers properly the outside options of individuals. In reality, the question is not whether a given interaction is better than being alone, but whether a given interaction is better than another interaction, possibly with a different partner [2,3]. We will present an overview of our modeling results in this field [4,5], together with the results of a model built specially to deal with the issue of equilibrium selection. We show that fairness evolves naturally when individuals have varied social opportunities, because the issue of each interaction is then constrained by the fact that it must bring at least the same benefit than other interactions. In particular, if two individuals have the same outside opportunities, they can agree upon an interaction only if it brings the same benefit to both of them. The indeterminacy of reciprocity is hence in large part an artifactual consequence of the way models are usually built, and the evolution of fairness does not require any form of group selection. References 1. Boyd, R. and Richerson, P. J. (2009). Phil. T. Roy. Soc. B, 364(1533):3281–3288. 2. Noë, R. and Hammerstein, P. (1995). TREE, 10(8):336–339. 3. Baumard, N. (2010). Odile Jacob, Paris. 4. André, J. B. and Baumard, N. (2011). Evolution, in press. 5. André, J. B. and Baumard, N. (submitted).

**Francis T. McAndrew & C. Perilloux.**

**The gender and personality dynamics of self-sacrificial “heroic” behavior in mixed-sex groups.**

It has been proposed that costly acts of altruism are conspicuous displays of resources or character traits that enhance status and position the altruist for future favors and resources. It was the goal of this study to test this prediction and to explore how the gender makeup of a group influences such behaviors. Seventy-eight undergraduates (39M, 39F) filled out a six-factor 30 item “Hero Scale” and then participated in a “group problem-solving study” in which the monetary success of a three-person group depended upon one of its members volunteering to endure pain (a cold stressor test) and inconvenience (getting soaked in a dunk tank). There were 13 groups consisting of two females and one male, and 13 groups consisting of two males and one female. Across groups, the behavior of the altruist was judged to be more costly, challenging, and important than that of other

group members and the altruist was rewarded with more money. Groups containing two males showed more evidence of competition for status and the influence of personality traits than did groups containing two females.

### **Slimane Dridi & L. Lehmann.**

#### **Evolution of learning rules in social interactions.**

It is commonly known that humans and animals have evolved the ability to display learning behaviors. However, evolutionary theory does not yet provide an answer to two important questions regarding these learning behaviors: First, how learning might be expressed in social interactions? Second, should learning behaviors be mediated by simple vs. complex cognitive processes? In order to provide insight about these two questions, we build an evolutionary model of learning. The genotype of an individual codes for a learning rule, i.e. a rule that tells how the tendency to take an action changes during life. We then analyze the evolutionary stability of two well-studied learning rules, namely reinforcement learning and belief-based learning, in a repeated game setting. Reinforcement learning is considered as the simplest learning rule because it prescribes that the tendency to play an action is updated based just on realized payoffs. On the other hand, belief-based learning is cognitively more demanding because it assumes that the individual is able to mentally represent all possible payoffs. We find that, in the Prisoner's Dilemma and the Snowdrift game, immunity of a learning rule against invasion depends on the initial conditions of the learning process. If individuals have initially non-cooperative strategies, both populations of reinforcement learners and belief-based learners are neutrally stable. On the other hand, if individuals start close enough to cooperation, reinforcement learning is an Evolutionarily Stable Strategy against belief-based learning, because two reinforcement learners can perform full cooperation. These results suggest that natural selection does not necessarily lead to a gradual increase in sophistication of behavior. Moreover, cooperation in humans and other species can be achieved through simple learning rules.

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#### **11.40-13.00: Late morning sessions 52-54**

### **Session 52. Evolutionary Cognitive Psychology. (*Antigone3*)**

#### **Gary L. Brase.**

Not all pictures are worth a thousand words: Differential effectiveness of visual aids in statistical reasoning.

In an ongoing debate about statistical reasoning competency, one view claims that pictorial representations help tap into the evolved frequency coding mechanisms of the mind, whereas another view argues that pictorial representations simply help one to appreciate general subset relationships. The present research used Bayesian reasoning problems, expressed in an ambiguous numerical format ("chances") and with different pictorial representations (no picture, roulette wheel diagram, abstract icons, and pictographs), to better understand influences on performance across these representation types. Although the roulette wheel diagram had no effect on performance, both icons representations significantly improved performance. Furthermore, across all the conditions, a frequency interpretation of the ambiguous numerical information was associated with superior performance. These findings strongly support the theoretical position that frequencies are a superior representational format for the human mind, as indicated by evolutionary considerations. These results also provide practical implications for how to present quantitative information to improve public understanding.

#### **Stephen Le.**

#### **Evolutionary time discounting.**

In 2005, Daly and Wilson described human intertemporal choice behavior as a puzzle for evolutionary theory. Evolutionary theory predicts exponential time discounting and increasing time discounting in older persons. Both of these propositions are routinely violated in empirical studies. Since 2005, however, two important models have been proposed that may help to resolve these puzzles: the Intertemporal Tradeoff model (Scholten and Read, 2010) and Decision-by-Sampling (Stewart, Chater, and Brown, 2006). The lessons from these models may be described by three propositions: 1) In many situations, animals, including humans, cannot calculate absolute magnitudes of attributes or expected fitness, or act in a way that reflects the availability of that information; 2) Animals are better at ordinally ranking attributes than calculating their absolute magnitudes; 3) Animals use multiple attribute evaluation mechanisms to make real-world decisions. Collectively, these propositions differ

from prior evolutionary explanations of intertemporal choice by incorporating cognitive limitations directly into the model, rather than assuming broad fitness maximization.

**Josh Ackerman**, J. Shapiro, V. Becker, S. Neuberg & D. Kenrick.

Effects of emotional expression on memory for the unemotional.

Research on face processing has been dominated by attempts to understand how faces bearing different characteristics are differentially processed. Here, we investigate whether seeing faces that signal various ecological affordances through their emotional expressiveness influences how other, unemotional faces are processed. Three experiments show that the particular expression and race of faces can alter memory in functional ways for faces not bearing these cues. Anger improved memory for neutral faces, happiness worsened memory for neutral faces, and fear improved memory but only for neutral cross-race faces. This research indicates that individuals are processed at a very basic level not only according to the features they display, but also according to the social context in which they find themselves.

**James Broesch** & J. Henrich.

Taboo as a system of inferences: simple heuristics allow for accurate identification of hazardous novel fish species in Fiji.

Traditional taboos among indigenous Fijians specify certain marine resources which should be avoided by women that are pregnant or lactating. An observer might question the fitness consequences of these taboos because of the dietary restrictions they impose on individuals with high nutritional demands. Recent work by Henrich and Henrich (2010) has shown that these taboos are targeted at local species that are bioaccumulators of the reef toxin ciguatera. This toxin can be contained in these species at levels which are not harmful to an adult, but could be harmful to a developing fetus or breastfeeding infant. However, what was not clear was if these taboos function via one-to-one matching to local species, or allowed for broader inferences. Here, we discuss a follow-up study which utilized an experimental approach to explore how this system of taboos shapes individuals' inferences about novel fish species. By varying the information that was presented to individuals across conditions, we were able to evaluate what type of information allowed participants to make consistent inferences about the potential risk of 9 North American species which varied in their likelihood of bioaccumulating toxins. Our results indicate that consistent, accurate inferences were made, across individuals, when some form of size information was presented. While bioaccumulation is the result of a species' position in the food chain, size is a good proxy for bioaccumulation risk. In other words, not all large fish are bioaccumulators, but all bioaccumulators are large. While some potential nutritional resources may be missed, which could have potential negative consequences during this time of high caloric demands, the more fitness costly harm to fetuses and breastfeeding infants would be avoided. Thus, size functions as a heuristic which errs on the side of caution in assessing the bioaccumulation risk of novel species. These results complement ethnographic findings and illustrate how mixed methods approaches can be used to explore the relationship between cultural models, behavior and health.

### **Session 53. Symposium: Parenting, Mating, and Life History Strategy (Rondelet)**

**Aurelio José Figueredo**, T. de Baca, M. Sotomayor-Peterson & V. Smith-Castro.

Shared parenting, combined parental effort, and life history strategy: a cross-cultural comparison.

Previous developmental research has found that children from households with high coparental agreement and equitable division of parental labors experience positive developmental and social outcomes; a major limitation of these studies is that the coparenting measures applied do not assess the total parental effort the child receives, but instead assess the partitioning of that effort between parents. Life History (LH) theory predicts that the total amount of parenting received should produce a greater developmental impact on the future LH strategies of children than precisely how that parental effort was apportioned between mothers and fathers. This report presents a cross-cultural study of University students in Mexico, the United States, and Costa Rica, investigating the effects of total as well as shared parental effort on family emotional climate and the LH strategy of the participants as young adults. The first study was performed exclusively in Mexico; the second study extended and replicated these findings Mexico, the United States, and Costa Rica. Study 1 found that the relation between higher levels of shared parenting experienced as a child and participant adult life history were mediated by family emotional climate. Study 2 found that higher total parental effort predicted shared parental effort,

positive emotional climate, and slower offspring adult life history strategy in the Mexico, the United States, and Costa Rica Samples. Interestingly, although Total Parental Effort and Shared Parenting are partially collinear due to the relatively large and positive effect of the former upon the latter, both Total Parental Effort and Shared Parenting afterwards make independent and complementary additive contributions to the Slow Life History of offspring as young adults. Furthermore, although some initial differences were found between the cross cultural samples in Total Parental Effort, all of the structural parameters in the model were replicated as statistically equivalent across all three cultures, as indicated by the lack of significant interaction terms between each of the predictor variables and the cultural contrast codes in influencing each of the criterion variables throughout the model. This offers strong support for the cross-cultural validity of our theory, at least in the three societies sampled. Challenging the traditional division of cultures into collectivistic as opposed to individualistic patterns, our data is rather consistent with previous research on parenting involving Anglo-American and Mexican samples that shows a remarkable similarity between parenting practices of Mexican and Anglo-American parents, once important parental factors as social class and educational level were controlled.

**Catherine Salmon, I.A. Kauffman, A.M. Cuthbertson, P.R. Gladden & A.J. Figueredo.**

Life history strategy, parental pressure, peer pressure, and differential vulnerability to disordered eating behaviors.

We performed two related studies to examine some potential sources of vulnerability to developing disordered eating behaviors. In study 1, we tested whether higher amounts of parental pressure from one's parents regarding three aspects of appearance (weight, clothing, and grooming) predicted the development of heightened intrasexual competitiveness and disordered eating behaviors in 152 female undergraduates, as indicated by scores on the EDI-2, a scale commonly used to measure symptoms frequently associated with bulimia and anorexia nervosa. Parental pressure was believed to be motivated by parental desires for enhancing daughter attractiveness to potential mates, thus representing a form of parental effort more associated with slower life histories. In study 2, the role of corresponding female and male peer pressures regarding appearance was examined, in addition to parental pressure, to determine whether its effects on intrasexual competitiveness and disordered eating behaviors paralleled that of parental pressures in 181 female undergraduates. In contrast to parental pressure, it was suspected that peer pressure might be shaped primarily by intersexual and intrasexual selective pressures rather than kin-selected altruism, and thus more associated with faster life histories. We also tested the alternative hypothesis that mother and female peer pressures were equivalent, collectively representing cues to intrasexual preferences, and that father and male peer pressures were equivalent, collectively representing cues to intersexual preferences. These measures of parental and peer pressure were expanded to include some items of direct instruction regarding appearance-related behaviors and others of indirect modeling of appearance-related behaviors. In addition, because these pressures might affect each woman differently, previously validated vignettes containing cues to different degrees of female competition in the social environment were used to determine different levels of vulnerability to such social cues. Validated measures of female intrasexual competitiveness were administered following being prompted by these randomly-assigned vignettes in a quasi-experimental design. We found that all appearance-related pressure variables, regardless of type or source, were positively and significantly correlated with both intrasexual competitiveness and disordered eating behaviors. We also compared the different degrees of sorority participation reported by each of the participants, and found that it was not a unique contributor to either intrasexual competitiveness or disordered eating behaviors, in contrast to the results of some previous studies. Nevertheless, we found that all types and sources of appearance-related pressure, whether from parents or peers, were positively associated with both intrasexual competitiveness and disordered eating behaviors to varying degrees.

#### **Session 54. Individual differences. (*Pasteur*)**

**Marco Del Giudice, B. Ellis & E. Shirtcliff.**

The Adaptive Calibration Model: An evolutionary-developmental framework for stress responsivity.

Individual differences in physiological responsivity to stress correlate with an impressive array of psychologically relevant variables, including aggression and antisocial behavior, risk-taking, attachment, personality, memory and learning, depression, anxiety, and so on. Empirical research in this field, however, has lacked an integrative theoretical framework, making it difficult to synthesize diverse empirical findings and impeding progress toward a

coherent “big picture” of the subject matter. Here we introduce the Adaptive Calibration Model (ACM), a comprehensive evolutionary-developmental theory of individual differences in stress responsivity (Del Giudice, Ellis, and Shirtcliff [in press], *Neuroscience & Biobehavioral Reviews*). The ACM extends and refines the theory of Biological Sensitivity to Context (Boyce & Ellis [2005], *Development and Psychopathology*, 17, 271-301). The key concept of the ACM is that the stress response system works as a mechanism of conditional adaptation, regulating the development of alternative life history strategies. Different patterns of activation and responsivity in early development modulate differential susceptibility to environmental influence and shift susceptible children on alternative pathways, leading to individual differences in life history strategies and in the adaptive calibration of stress responsivity. The main elements of the ACM are: (1) an evolutionary analysis of the functions of the stress response system, defined as an integrated, hierarchically organized system comprising the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal (HPA) axis; (2) a theory of the adaptive match between environmental conditions and stress responsivity; and (3) a taxonomy of four prototypical responsivity patterns (labeled sensitive [I], buffered [II], vigilant [III], and unemotional [IV]). The four patterns are characterized by combinations of physiological parameters indexing the functioning of the parasympathetic and sympathetic branches of the ANS and of the HPA axis. For each pattern, the ACM makes predictions about neurobiological correlates (e.g., serotonergic function), behavioral correlates (e.g., aggression, self-regulation), and developmental trajectories (including general patterns of gene-environment interaction). As the first integrative framework for the developmental study of stress, the ACM may contribute to boost the role of evolutionary theory in the fields of developmental psychology and psychopathology.

**Mark Adams, L. Penke & A. Weiss**

Natural selection on personality has a genetic basis.

Human personality is linked to several fitness-related outcomes including age at first birth, parental investment, longevity, and reproductive success. The evolutionary implications of the personality-fitness relationship can be investigated by adopting a selectionist approach, which involves measuring selection and complements more traditional, adaptationist approaches that try to deduce the original environmental conditions under which behavioral traits originated. While formal estimates of the strength of selection on personality have been made, the capacity for natural selection to shape personality rests on the additional, untested assumptions that fitness itself is heritable and that the covariance between personality and fitness is at least partly genetically based. We found that agreeableness in men and women and extraversion in men genetically covaried with fitness as measured by lifetime reproductive success. The relationship between low neuroticism and higher fitness in women was more likely environmental in origin, implying that selection would not change the mean of this trait. This shows that genetic models can be used to make robust inferences about the joint effects of natural selection on multiple behavioral traits in contemporary populations.

**Drew Bailey, D. Geary, R. Walker, G. Blomquist & K. Hill**

Personality and reproductive success in the Aché (Paraguay): implications for the evolution of human individual differences.

Humans differ from one another for many reasons, including differences in their immediate proximate environments, their developmental environments, their genes, or some combination. Despite considerable evidence for genetic contributions to individual differences in human personality, there is no consensus regarding how these heritable influences evolved or are maintained. The current study addresses the potential evolutionary mechanisms maintaining genetic variation in human personality by measuring relations between personality and reproductive success in a high fertility traditional population. Furthermore, the current study includes participants from two different villages, which allows for the first examination of whether the relation between personality and reproductive success varies depending on socioecological conditions.

**Steven Gangestad, R. Yeo & J. Liu**

Rare deletions predict general cognitive ability, brain neurometabolite concentrations, and schizophrenic phenotype.

Copy number variations or CNVs are variations in number of segments of particular strands of DNA an individual possesses, where strand length is at least 1000 base pairs and occasionally over 100000 base pairs. While two copies are generally the norm, some individuals may possess three or four, whereas others possess one or zero. CNVs are very common; they occur in thousands of genomic regions, and most people possess numerous

deletions and duplications. CNVs arise through a number of different processes, including non-allelic homologous recombination (NAHR), wherein one chromosome “mismatches” with its homologous chromosome during recombination, either deleting or duplicating a segment. NAHR is particularly likely to occur in genomic regions rich in segmental duplications—regions in which duplicated segments have occurred and spread through the population. Regions rich in segmental duplications, in turn, show evidence of recent positive selection, and overrepresentatively distinguish humans from close relatives. An interesting implication, then, is that genomic regions recently evolved in humans (and hence overrepresentatively responsible for recently evolved human features) tend to be relatively unstable. Evidence indicates that deletions are more deleterious than duplications, on average, and particularly so when rare or infrequent (e.g., relative frequency < 5% of the population). CNVs can be inferred from densely sampled SNP microarray data. We have found that sheer number of rare deletions individuals possess predicts: a) measures of general cognitive ability (two samples); b) concentrations of neurometabolites associated with neuronal integrity and energetic status of the brain (one sample), and c) schizophrenic diagnosis (one sample). Additional analyses offer suggestive evidence that deletions in regions rich in segmental duplications have, on average, greater effect than deletions outside of those regions. These findings have potential implications for the mutation theory of heritable fitness variation, as rare CNVs represent particular forms of typically deleterious mutation. But they may also underscore the possibility that human traits recently selected for, including psychological features, are susceptible deleterious effects of genomic instability. A fuller interpretation of these findings, within an evolutionary framework, requires examination of a broader array of phenotypic associations.

## POSTERS

### Group 1. Cognition.

#### 1.1. Gary L. Brase

Errors in memory of conditional rules: new evidence of domain-specific reasoning processes.

Reasoning about conditional rules has been explained in terms of evolved capacities for dealing with social exchanges (Cosmides & Tooby, 1992), but this interpretation has been controversial. Alternative explanations include traditional reasoning theories (e.g., mental models theory) and non-evolutionary domain-specific accounts (pragmatic reasoning schemas). To help disentangle these accounts, a series of studies looked not only at reasoning performance, but later memories of the conditional rules within the reasoning tasks. In a series of studies, participants were given three versions of Wason's selection task, with different context stories: a descriptive situation, a social contract (in the general format: "if one takes the benefit, then one pays the cost"), and a "switched" social contract ("if one pays the cost, then one takes the benefit"). After a 15-20 minute distracter task, participants were asked to either select the rules from the initial selection tasks from a list of six possible variants or to free recall the rules. Reasoning performance on the selection tasks replicated previously found patterns. As predicted by domain-specific reasoning theories, particular deontic modifiers of social permissions and obligation (may/must) were mis-recalled as part of the social contract rules. Specifically: a) The illicit addition of a "must" to the conditional rule occurred most often with standard social contracts (in the form "If one takes the benefit, then they pay the cost") b) The illicit addition of "may" to the conditional rule occurred most often with "switched" social contract rules ("If one pay the cost, then they take the benefit"), and there was also a pattern for this rule of both adding "must" along with switching the order of the terms in the rule (i.e., illicit conversion back to the standard rule form). c) Descriptive conditional rules, which should not elicit domain-specific reasoning processes, produced the least number of any changes in recalled rules. These results do not support domain-general models of human reasoning which account for deontic reasoning in terms of illicit conversion to the converse of the original rule. More generally, these are novel phenomena regarding spontaneous errors in conditional rule reconstructions from memory.

#### 1.2. Laura Dane, L. Goh, C. Clapperton & B. Fink

The truth is in the adaptations of the observer: attributions of deception depend on reproductive costs and attractiveness.

Recent research on deception has begun to focus on how perceivers' traits can influence judgments of deception. The purpose of this study was to explore how context can affect perceptions of deception. A 4 x 2 factorial study was designed to test whether attributions of deception differ depending on the level of deception cost (dating versus non-dating conditions) and target facial sexual dimorphism. Male and female participants were asked to make credibility judgments in one of four deception cost scenarios: evaluating a potential short-term date, a long-term date, a date for a friend, or a job applicant. In a photograph, the target individual was presented with either high facial masculinity, moderate facial masculinity or low facial masculinity. Results tend to support an error management perspective, which suggests men and women may differ in whether they over-perceive deception depending on reproductive costs.

#### 1.3. Alexis de Tiège & Johan Braeckman.

Why did self-awareness originate and evolve?

In the 1970s, the evolutionary psychologist and philosopher N. Humphrey and the primatologist G.G. Gallup both hypothesized that self-awareness and mindreading are related cognitive capacities. Their ideas were later theoretically and empirically refined as the so-called introspection-based 'Simulation Theory' of mindreading (e.g., A. Goldman, S. Platek, F. Focquaert). This view states that self-awareness relies on introspective metacognition and that mindreading is the result of (1) the introspective self-awareness of shared/simulated mental states followed by (2) the projection of this shared mental states onto others. While the evolutionary origin and adaptive functions of mindreading are intensively studied during the past three decades, the same cannot be said of self-awareness. According to some simulation theorists (Humphrey, Platek, Focquaert), self-awareness evolved because of the benefits it conveys to mindreading. That is, mindreading is assumed to be the only selective pressure driving the evolution of self-awareness. We will argue, however, that self-awareness did

evolve because it had some specific adaptive functions in the complex social life of our ancestors that are not reducible to the functions of mindreading. We will argue that – like mindreading – self-awareness, too, evolved as an instrument or system for ‘Machiavellian intelligence’, but that it did so by answering to specific selection pressures that mindreading is not able to deal with, i.e., selection pressures for (a) tactical privatization and concealment and (b) self-control and self-identity.

#### **1.4. Frank Eves & Guy Taylor-Covill**

##### **Slope perception: once survival positive, now survival negative?**

Survival dictates that energy expenditure should not exceed energy intake. Proffitt (2006) argues that an implicit process that perceives the resource cost of locomotion rescales explicit reality in line with locomotor resources. Climbing requires animals to lift their body weight against gravity, making it an energetically costly behaviour. Thus, avoidance of climbing would have survival value. Consistent with this premise, mammals do appear to avoid the energy costs of climbing. This has been shown in elephants (Wall et al, 2006), orangutans (Thorpe et al, 2007) and humans (Eves & Webb, 2006). When pedestrians are presented with a choice between stairs and escalators in shopping malls, 94.5% avoid expending energy by taking the escalator. Further, observational studies in public access settings reveal that those individuals with less available resources (e.g. the elderly) avoid the stairs more than their comparison groups (Eves, submitted). Here, we report three studies testing whether this avoidance is linked to perception of the steepness of the stairs facing pedestrians. Firstly, self-reported frequency of choosing the stairs rather than an escalator when leaving a train station was tested against individuals' slope perception. Secondly, in a shopping mall, we recruited pedestrians who choose either the stairs or the escalator and interviewed them about the ascent they had just made in an empty shop which had been converted into a perception laboratory. Finally, in Birmingham's Chamberlain Square, pedestrians choose either the stairs or a sloped walkway 38.5m before they reach the stairs for ascent. Stair and slope users were recruited after the choice had been made but before they attempted the ascent. Across all three studies, the choice was a significant predictor of perceived slope. Reduced levels of slope estimation were reported by individuals who a) reported more stair climbing (study 1), b) had just climbed the stairs (study 2) and c) were about to climb the stairs (study 3). To our knowledge, this is the first set of studies that provides direct evidence that perception of the steepness of a locomotor challenge may be an implicit cue that guides human behaviour. These results are consistent with locomotor choices being linked to perception of potential energetic costs of future behaviour. At first glance this process appears survival positive. In today's society, however, this process may be directly contributing to increased levels of obesity as it deters us from choosing freely available exercise as part of our daily lives.

#### **1.5. Glenn Geher, B. Crosier, H. Dillon & R. Chang**

##### **Evolutionary psychology's place in evolutionary studies: a tale of promise and challenge.**

March 2011 marked the publication of a special issue of *Evolution: Education and Outreach* (EEO), that focuses on the international Evolutionary Studies (EvoS) Consortium. This special issue, co-edited by Rosemarie Chang, Glenn Geher, Jennifer Waldo, and David Sloan Wilson, includes several articles that present the multi-faceted nature of EvoS. This presentation will discuss (a) the nature of the EvoS Consortium, (b) the special issue of EEO, and (c) an article from that issue focusing on evolutionary psychology's place within evolutionary studies in higher education. The EvoS Consortium and the academic programs borne of its creation have been wildly successful in their initial ventures. These achievements are marked by feedback from across the EvoS campuses, the resultant scholarly work produced by participating students, and faculty collaborations spurred by exposure to the organization. The success of EvoS is probably best marked by the recent NSF grant (CCLI Award #0817337), awarded jointly to SUNY New Paltz and Binghamton University, with the purpose of expanding EvoS beyond the bounds of these two institutions. A particularly noteworthy element of many EvoS programs is the role of Evolutionary Psychology (EP), a perspective in the behavioral sciences that addresses questions of human behavior from the perspective of evolution. In light of several forms of data, including analyses of a variety of disciplines drawn on from evolutionary psychologists in their work, we argue that evolutionary psychologists may well be the most naturally interdisciplinary scholars within the behavioral sciences, making them highly appropriate for inclusion in EvoS. But our research does not show only promise regarding the relationship between EP and EvoS – challenges are raised as well. We present additional data showing that EP is, by some counts, currently represented disproportionately within the EvoS world – a fact that clearly shows that there are

currently limitations to the potential impact of EvoS in modern academia. Scholars from other disciplines, particularly within the humanities and social sciences, seem to be missing the evolution revolution. Implications regarding how EvoS can broaden its scope to be even more powerful in its integrative mission are discussed.

### **1.6. Brice Gouvernet, S. Combazier & J.-L. Viaux**

Towards an evolutionary and integrative approach of the relationships between defense mechanisms and coping strategies.

Defense mechanisms are psychoanalytic concepts. Coping strategies emerge from biopsychosocial models. Defenses and Coping are among the most frequently mentioned concepts when studying the psychological adaptation to various stresses and threats - physical, social or psychic - that man can encounter. Each of these adaptive strategies has retained the attention of evolutionary psychologists independently of one another (eg, Nesse 1990, Nesse and Lloyd, 1992, Gutiérrez et al., 2007). However, little work are offering a combined study of them, and if, in the general literature, few theoretical models can be identified, (a) empirical validation are rare and are struggling to realize a dynamic and adaptive (b) the blur persists concerning the nature of their interrelationships. However, the therapeutic issues (type of support, planning support, therapeutic targets) and theoretical issues (relevance of an integrative model, unitary or modular vision of psychological adaptation mechanism ...) of such questioning are important. So we propose here to study the empirical validity of three models of the interrelationships between defense mechanisms and coping strategies. Based on the responses of 94 subjects young adults DSQ 40, CISS and PSS 14, we wonder whether it is appropriate to assimilate defense mechanisms and coping strategies like the DSM-IV TR (APA, 2000) or whether to distinguish these two categories of processes. We study the criteria that distinguish the defenses and coping: the opposition should it be done on the basis of relations with psychosocial success or is it more appropriate to consider the defense-coping relationships in terms of a hierarchically organized functional model? Our results show the need to distinguish the defenses and coping strategies: if significant correlations exist between these two categories of strategies, they remain at low amplitudes. The structural equation analysis also show that defense mechanisms and coping strategies can be viewed in terms of an integrative functional model. Defense mechanisms are the first adaptive operation: they impact the representation of the threat and help or hinder the adoption of appropriate coping. After discussing the method we consider the practical impact of our work and put our results in the context of theories of evolution and adaptation.

### **1.7. Bjørn Grinde.**

Happiness conceived as the net activity of rewarding and punishing brain modules.

A model of happiness will be presented based on an evolutionary perspective and current research in neurobiology and psychology. Briefly, the primary purpose of nervous systems is to direct an animal toward behavior conductive to survival and procreation; and as a rule of thumb this implies pushing the animal either to approach or avoid stimuli. Three brain "modules" are pivotal for this purpose: one for avoidance and two for attraction (seeking and consuming). While behavior originally was based on reflexes, in humans these modules operate by a system of negative and positive affect, and are swayed by cognitive processes. The evolutionary rational for moving from reflexes to emotional incitement and cognitive involvement was the advantage of a more flexible system with the capacity to adapt to previous experience. This change opened for the ability to enjoy life. An array of sub-modules has evolved to care for various pursuits, but recent studies suggest that they converge on shared neural circuits involved in mood; i.e., they converge on modules designed to generate what has been referred to as rewards and punishment. Happiness can be construed as the net output of the mood modules. Practical implications as to improving quality of life, based on this model, will be discussed.

### **1.8. Kathrin Masuch, R. Schatz, S. Egger, I. Holzleitner, E. Oberzaucher & K. Grammer.**

The duration effect in rating studies – quantity instead of quality?

During the last decade, rating studies have become one of the most popular methods for collecting subjective data from humans. This trend does not only apply to research in the fields of Human Ethology or Evolutionary Psychology but also to Quality of Experience (QoE) and Human Computer Interaction (HCI). Since these rating studies tend to be highly time-consuming and require a considerable number of subjects, researchers try to maximize output quantity by extending the number of test conditions and thus session duration of these data collections. But does quantity in content and time beyond a certain point negatively affect the quality of these

test results? In general, there are two different ways of measuring participant fatigue: subjectively by questionnaires (e.g. the NASA Task Load Index TLX) and objectively by physiological measurements (S.G. Hart & L.E. Stavenland, 1988). Previous studies (R. Schatz et al., 2010) showed that even if there is no statistically significant effect of fatigue visible by analyzing eye blink rate detected by a face-video, subjects mentioned higher fatigue at the end than on the beginning of the test and variability of ratings increases. In order to measure participant fatigue, we used an electrocardiogram (ECG) and calculated the individual heart rate variability (HRV) of our subjects. The comparison between these measurements at the beginning, right before and after a short break and at the end of our study, provides a good indication about the maximum duration a rating study can last, without sacrificing data quality. S. G. Hart and L. E. Stavenland (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. in Human Mental Workload, P. A. Hancock and N. Meshkati, Eds. Elsevier, 988, ch. 7, pp. 139–183. R. Schatz, S. Egger, K. Masuch (2010). Gain from Strain? Assessing the Impact of User Fatigue on the Quality of Subjective MOS Ratings. Presented at the Third International Workshop on Perceptual Quality of Systems (PQS) in Dresden, Germany.

### **1.9. Mary Maxwell & Shiva Motlagh**

Man without mind.

We will look at the 2008 argument by Jaak Panksepp\* that language followed from emotion. He reduces the various affects to seven that are essential for mammalian survival: 1. SEEKING (ambition to get resources, including status), 2. RAGE (responding with negative feelings to frustration), 3. FEAR (sensing danger), 4. LUST (male and female sexuality), 5. CARING (nurture of one's offspring), 6. PLAY (joy), and 7. PANIC (separation distress). The affects were expressed by gesture and vocalization before the cortex was able to create symbolized communication, i.e., speech, says Panksepp. At the same time we will investigate the classification of English words into 6 classes, as organized by Dr Peter Mark Roget in his Thesaurus (1852). Roget's six classes (that oversee all 1000 subsets in this famous book of synonyms) are: 1. Words expressing abstract relations -- including time and causation, 2. Words relating to space -- including dimension and motion, 3. Words relating to matter – both inorganic and organic matter, 4. Words relating to the intellectual faculties — divided into: the formation of ideas, and the communication of ideas, 5. Words relating to the voluntary powers – divided into: individual volition and social volition, and 6. Words relating to the sentient and moral powers – divided into: personal affections, sympathetic affections, moral affections, and religious affections. Does Roget's classification contain a hint that the ability to think in words, i.e., to process symbols, was built on a substrate of particular mental capabilities -- e.g., perceptual and reasoning functions and social affections? (Note: we are not attempting to correlate the claims of Panksepp and Roget, although the juxtaposition is stimulating!) Since Roget was able to fit the entire vocabulary of his native language into this scheme, he may have been onto a natural history of the human brain, whether he knew it or not. The title of our poster session, "Man without Mind," refers to the question of how far human nature had developed before symbolic communication was available.

\*Jaak Panksepp, "The Power of the Word May Reside in the Power of Affect" Intergr Psych Behav (2008) 42: 47-55.

### **1.10. Matteo Meschiari**

How landscape invented mind. An evolutionary theory.

My paper will discuss the basis of Landscape Mind Theory (LMT) that I previously formulated in certain essays. Using ethnographic case studies and new data from neuroscience, I will explore the impact of landscape and the ecosystem on the shaping of cognitive processes in Homo sapiens sapiens. The paper will focus in particular on hunter-gatherer societies, and will show how hunting practices on the one hand and symbolic thought related to the environment on the other are related to both evolutionary and cultural factors. A particular emphasis will be placed on the imaginative activity of hunter-gatherers.

### **1.11. Virginia A. Periss, Carlos Hernandez-Blasi & D.F. Bjorklund**

The development of the “cognitive-babyness” effect in adolescence.

In previous studies, we reported that some forms of preschoolers' immature thinking, namely immature expressions of supernatural thinking (e.g., finalism, “Big peaks are for long walks, and small peaks are for short walks”), compared with immature forms of natural thinking (e.g., overestimation, “I can remember the 30 cards”), are particularly appealing to adults, analogous to the hypothesized “Kinderschema” (infant schema) effect reported by Konrad Lorenz for infantile physical features (Bjorklund et al., 2010). In this study, we searched

for the developmental roots of this “cognitive-babyness” effect. We asked 268 American children and adolescents ranging from 10 to 17 years of age to rate a series of vignettes presenting different expressions of immature and mature thinking attributed to young children, some expressing supernatural thinking, and some expressing natural thinking. Results indicated that older adolescents (14-years and older) performed on par with adults tested in previous studies, rating children who expressed immature supernatural thinking positively (e.g., friendly, likeable), and rating children who expressed immature natural thinking negatively (e.g., sneaky, impatient with). However, younger adolescents consistently rated all forms of immature thinking less positively than mature forms, suggesting that this “cognitive-babyness” effect develops in adolescence. Overall, the findings support the hypothesis that adults and older adolescents (but not younger adolescents) are particularly sensitive not only to physical-appearance cues of babyness, but also to some cognitive-linguistic ones, consistent with Hrdy’s “cooperative breeding” hypothesis, underlying the high sensitivity of adults, in allomothering terms, towards children. We also suggest that supernatural thinking may have a unique role in humans, fostering positive perceptions of young children in older adolescents (and adults) as they prepare for the role of parenthood.

### **1.12. Elisabeth Rolland-Thiers, A. Milhau, L. Heurley & M. Launay**

Temporal evolution of an human implicit learning: a case of visual-spatial priming.

Natural events sequence are almost never random but entail some regularity or structure. When exposed to a regular sequence, human learn to exploit its predictable structure (Jiménez, 2008, Reber, 1989). Implicit learning is considered as an adaptative mode in which subject's behavior is sensitive to the structural features of an experienced situation, without the adaptation being due to an intentional exploitation of subject's explicit knowledge about these features (Perruchet & Pacton, 1998). It has been studied extensively by using the serial reaction time (SRT) task (Nissen & Bullemer, 1987). Participants must identify the location of a target, between four possible locations, by pressing a key mapped to the location. Unbeknownst to the participant, the location of successive target follows a determined sequence (often 10 or 12 units long), repeated over the task. Typically, participants show a decrease in response times (RTs) when the stimuli appear in the sequence and an increase in RTs when the stimuli appear randomly, showing a sequence learning. Our experimental work aims to study the influence of a visual-spatial priming on such an implicit sequence learning. We compare three cases of visual-spatial priming in a modified SRT task : Positive priming, Negative Priming and Neutral Priming. In Positive priming condition, the target can appear (after 100 ms) only in one of the possible background displays which become predictive of the location of the target over the task. Conversely, in Negative priming condition, the background displays are not predictive of the location, that is, the four possible backgrounds are regardless associated with all the possible location over the task. Last, the Neutral Priming condition is a control condition: target just appears on a colored background. In all conditions, results show a typical implicit sequence learning, but our study complete this classical results : (RTs) evolve differently during learning, regarding conditions. At the beginning of training, RTs in Positive priming and Negative priming conditions are both slower than in Neutral priming condition. At the end of training, Negative priming RTs become slower than Neutral and Positive priming RTs. This results reveals that a complex temporal sequence learning can interact with a more associative and perceptual priming when this one underlines the predictable structure of sequence. It suggest that brain, perception system and cognition had evolved to be essentially proactive (Glenberg, 1997; Bar, 2007; Barsalou, 2009), especially in human ability to anticipate forthcoming events.

### **1.13. Pia Stephan, E.h Oberzaucher & K. Grammer**

Sex differences in urban home ranges and the accuracy of cognitive maps.

According to the Hunter-Gatherer-Theory Silverman and Eals (1992) hypothesize that men and women evolved different spatial abilities and adapted to differential home ranges based on the sexual devision of labor. Many previous studies provide evidence of corresponding sex differences in spatial abilities (e.g. orientation strategies, mental rotation, recall of object arrays). Furthermore, sex-differential mobility in today's hunter-gatherer-societies is in line with predictions from an evolutionary perspective. In our study we combined the investigation of home range size in an urban environment and spatial abilities by accuracy analysis of cognitive maps. 87 Participants drew a sketch of their home range in Vienna depicting all places regularly visited in every-day life. On the basis of the drawn places' geographical locations we estimated the home range size. Moreover, we used Geometrics Morphometrics to quantify the accuracy of cognitive maps by means of Euclidean distances between

the corresponding landmarks in the drawings and the real maps of home ranges. Our results show a non-significant trend for men to have a larger home range. A significant sex difference in ranging occurs in a subsample of participants frequently visiting more than nine places. The comparison of sketches and real maps of home ranges reveals that men sketch peripheral places more precisely. This result suggests that men and women differ in the accuracy of cognitive maps. In addition, a correlation between home range size and accuracy of cognitive maps can be shown; the larger the home range, the more accurate the sketches. Our findings indicate that evolutionary-based sex differences in home range size and spatial abilities persist in humans living in urbanized western societies. Reference: Silverman, I., & Eals, M. (1992). Sex differences in spatial abilities: Evolutionary theory and data. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 533–549). New York: Oxford University Press.

#### **1.14. Michele K. Surbey & Jessica a. Chewe**

Predictors of the manipulative Machiavellian mind.

Although human beings are a relatively social and cooperative species, some individuals exhibit non-cooperativeness and Machiavellian tendencies. Machiavellianism has been defined as an exploitative strategy of social conduct that involves manipulating and deceiving others for personal gain. Consistent with the view that Machiavellians are exploitative, it was hypothesised that Machiavellians would be less likely to cooperate on PD games than other individuals, and report low levels of self-deception and trust. In order to successfully manipulate and deceive others, emotional intelligence, social intelligence, and theory of mind are considered to be essential. Thus it was expected that Machiavellians would have average to above average scores on measures of these abilities. In addition, childhood bullying behaviours and low empathy were expected to be predictive of Machiavellian tendencies in adulthood. Participants ( $N = 164$ , mean age = 28.43 yrs) were administered a number of self-report questionnaires, including the Mach Scale (Allsopp et al., 1991), Self-Deception Questionnaire (Sackheim & Gur, 1978), Interpersonal Reactivity Index (Davis, 1980), and the Self-Rated Emotional Intelligence Scale (Brackett et al., 2006). They also completed laboratory tasks measuring emotion recognition ability and theory of mind. As predicted, Machiavellian individuals reported significantly lower scores on measures of cooperation, self-deception, and trust. In addition, results suggested that Machiavellians exhibited average to above average levels of emotional and social intelligence, and average theory of mind abilities. Furthermore, a history of childhood bullying and low levels of empathy were predictive of Machiavellian predispositions in adulthood. Suggestions for further research and implications of the findings with regard to the maintenance of this anti-social personality characteristic in human populations as a conditional or frequency-dependent trait are considered.

#### **1.15. Wataru Toyokawa, T. Kameda & H.-R. Kim**

Can humans show “swarm intelligence” under uncertainty as do honey bees?

Sharing information through a series of waggle dances, honey bees can often choose the most profitable nectar source or nest site in an array of possibilities (Seeley. 1995, 2010). A key factor underlying the emergence of the “wisdom of the hive” under uncertainty is the fact that, although bees are affected by other bees’ dances to decide where to search, each bee assesses the profitability of the visited site independently (List et al., 2009). In human societies, there are many examples of similar situations in which public information is available to help people make better decisions (e.g., restaurant information on the Internet). Yet, it seems questionable that human individuals always execute independent assessments, and as a result, whether collective information would generate “swarm intelligence” is unclear (Kameda et al., 2011). To explore this, we have conducted a laboratory experiment in which 5 human participants each had to repeatedly choose one lot (gamble) from an array of 6 lots with different expected values under uncertainty. After each participant made an individual choice, he/she was informed of the choice’s payoff outcome, and was asked to evaluate the chosen lot’s profitability on a five-point scale. Before their own choice phase, each participant was shown aggregated social information about cumulative choice frequency and average evaluation (but not others’ individual choice outcome information) for each of the 6 lots up to the current round. Conditions in which humans can generate “the wisdom of crowds” are discussed.

### **1.16. Emmanuel Viglieno, L. Munilla, W. Briki & M. Jimenez.**

Evaluation of perception in a categorization task: the dynamics of phase transition.

Catastrophe theory (Thom, 1975; Zeeman, 1976) is designed to model discontinuities in evolution of systems. Following the spread of dynamical systems account within cognitive sciences, catastrophe theory has been applied in development (e.g., Jansen & van der Maas, 2001; van der Maas & Molenaar, 1992) and perception research (e.g., Stewart & Peregoy, 1983; Ploeger et al., 2002). In line with this approach, we claim that a discontinuous perception of a continuous physical environment is best described by dynamic of phase transition models in catastrophe theory. Hence, we constructed an experimental protocol to test the more parsimonious model of phase transition. The CUSP CATASTROPHE MODEL includes several predictions termed Catastrophe Flags (Gilmore, 1981). Five flags were tested in our work: bistability, sudden jump, hysteresis, divergence, and critical slowing down. To this end we used a two alternative forced choice task with gradually changing images from male to female. The CUSP model is an application of two real-dimensions control plane on one-dimensional phase space. Our scope was to construct a design for those three parameters. In line with a traditional approach we used perceptive bias within two categories as the first control parameter, the normal variable (Hock et al., 1993; Tuller et al., 1994; Gori et al. 2008), associated with the hysteresis effect and the sudden jump, and this yielded the perceived category as the state parameter. The selection of splitting variable, which determines the divergence effect, was based on the main principle of open systems dynamic far from equilibrium: entropy growth (Glansdorff et al., 1974; Nicolis & Prigogine, 1977). If entropy is the main cause of dynamics, time appears to be a valid factor. Hence, we used the inter-trial-time-interval as our splitting variable to monitor time pressure within system dynamics. Our hypothesis was that with delayed decrease, pressure on the system will increase and divergence will follow. According to the model and our hypothesis, we found bistability, hysteresis, divergence, and critical slowing down effects, linked in a canonical CUSP. The results support catastrophe theory applications in human cognition with an emphasis on interpretations of dynamical systems account in the psychology of perception. Maybe, von Foerster's claim that perceived reality is not simple information processing but a construction emerging from an autonomous complex cognitive system entangled in a physical unknown world, is relevant in this field?

### **1.17. Juliane Wilcke**

Evaluation of research strategies used in evolutionary studies of consciousness.

Several problems in the research literature on the evolution and potential functions of consciousness can be attributed to poor awareness of relevant research strategies and their characteristics and to the ensuing failure to use suitable strategies. For example, evolutionary hypotheses on consciousness tend to be particularly underdeveloped and insufficiently supported, and means of inquiry are frequently not specified, inappropriate, or poorly implemented. Here I present the results of a systematic evaluation of the promise of 12 research strategies that have been employed with the aim of making progress toward a scientifically respectable evolutionary explanation of consciousness. The strategies can be grouped into (a) input-focused strategies, (b) general reasoning strategies, (c) general research strategies advocated for consciousness studies, and (d) evolutionary strategies proper. To be able to systematically evaluate these research strategies, it was necessary to construct a suitable evaluation tool. The tool combines qualitative analyses of the strategies with the use of rubrics for assigning weighted scores on multiple criteria concerning a strategy's relevance, efficacy, and practicality. Although multiple methods should be used to approach research questions and the particular research situation taken into account when selecting a strategy, the evaluation results allow general recommendations to be made about which strategies are most likely to advance research on the evolution of consciousness: Comparative methods are most promising for increasing our knowledge about the evolutionary history of consciousness, followed by inferences from models or theories of consciousness. The three general research strategies in group (c) hold additional promise for determining evolutionary functions of consciousness and/or evolutionary alternatives. Better knowledge of available research strategies is important for the evidence-based development of evolutionary theories of consciousness.

### **1.18. Michael Woodley.**

Towards a fully evolutionarily and ecologically informed model of human intelligence.

In this poster, the rudiments of an integrative evolutionary ecological model of human intelligence will be presented. An attempt will be made to reconcile the domain specific modular cognitive adaptations of

evolutionary psychology with individual differences in apparently domain general cognitive functioning variables such as g, through the presentation of a meta-cognitive modular network model which is based on the idea that there exist three processing levels. i) The encapsulated modules of evolutionary psychology, ii) de-encapsulated local modular networks, iii) the global meta-cognitive network (inclusive of all local networks and modules). It is argued that there are four types of problem solving 'styles' associated with this hierarchy. i) Contextualized domain specific reasoning, which is associated with specific encapsulated modules providing rapid responses to highly domain specific problems (i.e. language acquisition, cheater detection etc). ii) Decontextualized domain specific reasoning, which is associated with a limited combinatorial explosion of meta-representations arising from all modular elements in the network 'pooling' their representations (this permits spontaneous and implicit problem solving associated with creativity). iii) Contextualized domain general reasoning, which is associated from the engagement of local modular networks in the solving of domain general problems present within a specific evolutionary context (e.g. mating vs. social vs. practical - individual differences in this faculty give rise to abilities). iv) Decontextualized domain general reasoning, which is associated with the engaging of the entire modular consortium in the solving of domain general abstract problems, which are wholly context free (i.e. Raven's Matrices items). These domain general problem solving mechanisms are effortful and controlled, as they rely upon executive functions associated with information retention and manipulation (i.e. working memory), which frame the domain general problems via meta-representational filtering and induction. Whilst both types of implicit and explicit processing could be considered to be part of intelligence (Kaufman, 2011), it is individual differences in the latter processing style, which is primarily associated with the level of g. This model is finally discussed in the context of a new developmental life history theory of intelligence, the cognitive differentiation-integration effort hypothesis (Woodley, in press). Kaufman, S. B. (2011). Intelligence and the cognitive unconscious. In R. J. Sternberg & S. B. Kaufman (eds.), *The Cambridge Handbook of Intelligence* (pp. 442-467). New York: Cambridge University Press. Woodley, M. A. (In press). The cognitive differentiation-integration effort hypothesis: A synthesis between the fitness indicator and life history models of human intelligence. *Review of General Psychology*, doi:10.1037/a0024348.

### **1.19. Kunihiro Yokota & D. Nakanishi**

Normative conformity as coalition formation to cope with threat of disease infection.

Previous research has shown that prejudice and discrimination against outgroups can stem from the disgust emotion as part of a "behavioral immune system". It has been suggested that humans have psychological mechanisms which promote coalition formation with ingroup members in order to cope with fitness-relevant threats from outgroups such as disease infection and moral transgression. However, no studies on group dynamics have investigated how behavior and social cognition geared toward avoiding infectious disease and moral transgression can lead to collective action. In this study, we examined the relationship between conformity orientation and disgust sensitivity. It was found that conformity, especially that based on informative influence (informative influenced conformity), works as the uncertainty-reduction mechanism. The adaptive function normative based conformity is to make social coordination for coalition formation efficient and smooth. We hypothesized that normative conformity would be related to threat of disease infection, but not related to the threat of moral transgression. This is because the solution to coping with threat of disease infection is to avoid and isolate infected targets by means of smooth social coordination and cooperation with other ingroup members. However, the solution to cope with threat of moral transgression is to break ties with those who make moral transgression. In this case, there is no need to form coalitions, but rather reputational information is needed. Therefore, normative influenced conformity should be positively correlated with threat from disease infection, but not with threat to moral transgression, while informative influenced conformity should be positively correlated with threat to moral transgression. Participants (n = 160) responded to the Three Domain of Disgust scale and the Conformity Orientation scale. Results revealed that, consistent with our hypothesis, individuals scoring higher on normative influenced conformity showed higher sensitivity to pathogen disgust, but not to moral disgust. On the other hand, informative influenced conformity was positively correlated with both pathogen disgust and moral disgust. We will discuss how the psychological mechanisms of group dynamism when human faced on fitness-relevant threat.

## **Group 2. Cooperation and reciprocity.**

### **2.1. Béla Birkás, B. Lábadi & T. Bereczkei**

Trustworthiness of a face depends on gaze direction.

According to the model of Oosterhof & Todorov (2008), faces are evaluated on two primary, independent dimensions: valence and dominance. Consistent with theories that posit that evaluation of emotionally neutral faces is constructed from facial cues that have evolutionary significance (Zebrowitz & Montepare, 2006), they argue that face evaluation is an overgeneralization of adaptive mechanisms for guiding appropriate social behavior. Specifically, valence evaluation of faces is based on facial cues resembling emotional expressions signaling whether the person should be avoided or approached. The dimension of valence can be approximated by judgments of trustworthiness. Eyes have great impact in our social life, e.g. if someone falls one's eyes, it could mean, he feels guilt, consequently, he broke a social rule, we should not trust him. We created 2 experiment, in which we investigated the role of gaze in trustworthiness decisions. In the first work, we used photos from different individuals (5 male and 5 female). We took pictures from them looking in the main directions (forward, left, right, up and down). Subjects looked at a specific direction in the same degree. In our second experiment, using morphing technique, we made a male and a female average face picture (we used 6 photos from different individuals). With this manipulation, we attempted to avoid differences derived from deviations in attractiveness. In the first study, according to our results, the attractiveness of faces had more influence in trustworthiness decisions as gaze direction. Generally, more attractive faces were rated more trustworthy than less attractive faces. There was a significant difference between female and male subjects: in the ratings of females, gaze direction and attractiveness had significant effect. For male participants, the effect of attractiveness was significant, but gaze direction was not, or for limited extent. Using average faces (which are more attractive as individual faces) the role of gaze emerged. Here, the difference between female and male participants was similar to the first study: gaze direction has a significant role in the trustworthiness ratings of female subjects, but it has no or slight influence on decisions of male participants. To summarize, women are more sensitive to gaze direction, which could be a relevant cue in evaluating trustworthiness. Men, compared to women are less sensitive to this cue, they rate people less trustworthy, as a general strategy to avoid exploitation.

### **2.2. Pierre Courtois, T. Tazdaït & R. Nesah**

How to play the games? Nash versus Berge behavior rules.

Social interactions regularly lead to mutually beneficial transactions that are sometimes puzzling. The prisoner's dilemma and the chicken and trust games prove to be less perplexing than Nash equilibrium predicts. Moral preferences seem to complement self-oriented motivations and their relative predominance in games is found to vary according to the individuals, their environment, and the game. This paper examines the appropriateness of Berge equilibrium to study several 2x2 game situations, notably cooperative games where mutual support yields socially better outcomes. We consider the Berge behavior rule complementarily to Nash: individuals play one behavior rule or another, depending on the game situation. We define non-cooperative Berge equilibrium, discuss what it means to play in this fashion, and argue in an evolutionary perspective why individuals may choose to do so. Finally, we discuss the relationship between Nash and Berge notions and analyze the rationale of individuals playing in a situational perspective.

### **2.3. Tamas David-Barrett & R. Dunbar**

*Homo bellicus*: a war hypothesis.

In the history of explaining the behaviour of human societies, war is often assumed to play a central role. There have been two main themes behind such theories so far. In one line of argument, fashionable in the decades following WWII, war is a natural consequence of humans having evolved to be 'killer apes': aggression towards others was hypothesised to be a key trait of modern humans. Chimpanzee studies were often cited in support this theory. This hypothesis, however, went out of fashion as more cooperative traits were shown to be at least as common a feature of modern humans as aggression, a point further supported by the discovery of bonobos and studies of their behaviour. Another line of argument assigns a societal function to war, typically, controlling the population size. In this hypothesis, especially favoured by cultural anthropologists, 'primitive' war emerges as a reaction to population pressure. War brings about a reduction in population size, and thus is

essentially an adjustment to the capacity of the environment. In this paper, we propose a different approach. We suggest that war, or to be precise, inter-group violence, was a central element of an early phase of evolution of modern humans. Today's warfare, tribal or modern, is merely a remnant of this period. Furthermore, we argue that a host of other behaviour traits also emerged during this warring phase of human evolution: the human capacity for music, language, forming large groups, and our large brains. To support our argument, we provide a formal mathematical model of behavioural synchrony in multi-level networks, with evolutionary dynamics concerning (a) personal network formation, (b) dyadic communication abilities, and (c) inter-group aggression.

#### **2.4. Milena Dzhelyova, T. Backfield, I. Jentzsch & D. Perrett**

Gaze direction and cooperativeness.

Gaze direction has an important role in assessing threat, social learning and interactions as well as understanding of others' intentions. Correct interpretation of gaze direction is adaptive in various circumstances particularly in avoiding threatening situations. In many species, eye contact is regarded as a nonverbal behaviour communicating dominance. It can be interpreted as challenging and signalling danger in agnostic encounters. On the other hand, in social interaction direct gaze is interpreted as signalling engagement and interest in a mutual interaction. Gaze has also an important role in deception. Even from an early age, averted gaze is associated with lying. The validity of this association however, is questionable, as recent research using gaze tracking actually showed an increase in eye contact when lying. Gaze may also signal cooperativeness and trust considering its apparent role in deception detection. Thus, we were interested in investigating the importance of direct gaze in attribution of cooperativeness. We asked 45 participants (18 male, age range 18 - 22) to select the more cooperative image from a pair of images depicting the same individual but with varying vertical gaze direction and head orientation. Our results suggested that direct gaze (75%) or gaze slightly looking down 3° (67%) but still within the cone of direct gaze are perceived as more cooperative than gaze deviating up or down more than or equal to 6°, hinting that in social trait attributions, direct gaze is interpreted as a signal of interest and trust rather than as a signal of threat and challenge.

#### **2.5. Karl Frost**

Does ritual support in-group cooperation?

Does group ritual support in-group cooperation? Frost, Karl J Folk wisdom and anthropological theory contend that ritual has the effect of aiding in group cohesion. Through inter-group selection it is predicted to become wide-spread in populations via increased levels of in-group altruistic cooperation. Those groups that have more ritual activities, by this argument, fair better than other groups, causing the spread of ritual through populations as a solution to free-rider problems in cooperating groups. Richard Sosis has in the last decade argued for a costly signaling function of ritual within groups, and has done empirical work supporting this hypothesis – that rituals serve as a costly, hard-to-fake signal of group membership. This study engages with this question via an experiment in which participants in an interactive theater event are randomly divided into treatment groups to participate in individual vs group ritual activity in the form of a simple mindfulness meditation. After the facilitated meditation, levels of in-group and out-group cooperation are assessed via anonymous play in common pool resource games. The hypothesis is that individual ritual would not affect cooperation levels, but that group ritual would increase in-group, but not out-group cooperation. The first round of studies (N =335) has validated previous studies that show higher cooperation in-group than out group, with minimal or no facilitation of group formation. Differences of in-group cooperation in association with group ritual are in line with predictions, although, unpredicted by the hypothesis, in-group/out-group difference was almost eliminated by group ritual, in comparison to individual ritual and control groups. Sponsor: UC Davis Department of Anthropology and Department of Theater and Dance.

#### **2.6. Ayaka Hatano, Y. Horita & T. Yamagishi**

The effect of consensus on punitive behavior.

Experimental studies of observers' responses to punishers vis-à-vis non-punishers generally indicate that punishers are trusted and selected as desirable partners in some experimental games, but do not receive extra monetary benefits from or be liked by other members who are affected by the free rider (e.g. Horita and Yamagishi, 2009; Kiyonari and Barclay, 2008). We suspect that the lack of positive responses from other cooperators to altruistic punishers observed in those studies were due to the fact that punishment was done by the punisher without endorsement from other members. Punishment in small societies usually goes through

steps of consensus formation through meetings and gossip exchanges (Wiessner,2005). In this study, we experimentally investigated the effect of consensus on the punitive behavior. Specifically, we tested whether endorsement of punishment by other group members ("consensus condition") facilitates punitive behavior. In the experiment, every participant played a one-shot, four-person public goods game with an additional punishment stage that followed the contribution stage. After the public goods game, participants were informed that two of the other three "members" (actually computer responses) cooperated, and one defected. In the consensus condition, players were provided with a "voting" session in which they were asked to announce if any of the members should be punished. What they announced had no binding power. The two "cooperators" stated that the sole defector should be punished. After the voting result was announced, the participant was asked to decide if he/she spend his/her own money to punish the defector. In the control condition, this voting session did not exist. No significant difference between the conditions was found in the proportion of the participants who spent their own money to punish the defector, or the average amount of money they spent for punishment, while concern for gaining a bad reputation for punishing another person decreased in the consensus conditions. The motivations for seeking fairness correlated strongly with punishment in the consensus condition, and not in the non-consensus condition. Among those who were highly motivated to punish defectors ( $n=33$ ), participants in the consensus conditions paid on average more money to punish the defector compared to the participants in the non-consensus condition. Endorsement of punishment by other group members seems to facilitate the participants who were motivated to punish defectors to actually do so.

## **2.7. Kathleen Heath, J. McCullough, K. Norton & A. Ballinger**

Within-group elimination strengthens in-group conformity in times of resource competition: a case of the Salem witch-hunts.

Extensive research over the past ten years (initiated by the works of R. Boyd and P. Richerson) have argued that the hallmark of human evolution lies in understanding cultural adaptation, cooperation, conformity, within group rewards and punishment and between group competition. Although numerous theoretical, modeling, and experimental research support these claims, few examples exist among known human groups. Here we test these ideas against the well know Salem witch-trials of Colonial America. By the early 1690's the farmers of Salem Village faced external stresses from Native American attacks to the North and West, and the internal stresses of population pressure and land exhaustion. In early 1692 the pressure burst and the result was the infamous Salem witch accusations, trials and hangings. This episode in American history has been commonly accepted as a rivalry between Salem Village and Salem Town. We suggest a different scenario in which the pressures resulted in a demand for within village conformity, a great virtue in Colonial New England. Therefore, the village partisans cooperated to punish the free riders, non-conformists and interlopers within the village itself.

## **2.8. John Hinshaw**

Local union leadership: prize to be won or price to be paid?

This paper applies evolutionary theory to the study of recent labor history. Unions are a form of cooperative behavior that can be effective, but are also prone to individualistic defection. Game theory and behavioral economics suggests that cooperative strategies can be maintained if altruistic punishers maintain group cohesion by imposing costs on free riders. This study suggests that local union leaders appear to perform as altruists. Leadership is extremely time consuming, and often stressful. Members place demands on leaders, as do company managers and union officials. Consequently, it is not surprising that local union leaders die several years earlier than either union members or national leaders. (This data is based on several hundred biographies and obituaries of male and female union members, local union leaders, and national leaders or officials). Moreover, the demanding nature of union work helps explain why only half of female union leaders become mothers. To become elected to local office, members need to show their skills in grueling low-level work as a shop steward or griever. This testing period comes early in a workers' life; women essentially have to make a trade-off between having children or pursuing union leadership. Men who become national leaders do become fathers, although rates of fatherhood are somewhat lower for local union leaders. The perspective in this paper, an example of Darwinian history, is in contrast to that of most historians, who see union leaders as occupying self-interested and high-status positions. Most historians explain the low levels of female participation and leadership as examples of male exclusion. This paper explains the low levels of female participation as the result

of union leadership being a costly pursuit in terms of stress, opportunities for reproduction; male bias would raise those costs still higher.

### **2.9. Kai Hiraishi, C. Shikishima, Y. Takahashi, S. Yamagata, Y. Sugimoto & J. Ando**

Heritability of decisions and outcomes on Public Goods Games.

Prosociality is one of the most distinctive features of human beings. However, there are certain individual differences in prosociality. Employing the twin method, we examined the heritability of cooperativeness on public goods games using a strategy method. In the two experiments, twin participants were asked to indicate 1) how much they would contribute to a group when they did not know how much the other group members were contributing, and 2) how much they would contribute if they knew the contribution by the others. Study 1 employed a group experiment in which participants could see each other (N=317). Study 2 employed a web experiment in which participants individually submitted their decisions via internet (N=282). The genetic and environmental influences on the phenotypic variations were estimated with Bayesian MCMC modeling. Overall, more than half of the phenotypic variations were explained by familiarly non-shared environmental factors and errors while the heritability estimates were relatively small for each type of decisions. Interestingly, the heritability estimates were larger when the participants knew that the others had made larger contributions. In order to examine the expected outcomes of the participants' strategies, we conducted Monte Carlo simulations with the study 2 data (Study 3). One simulation employed a one-shot public goods game in calculating the outcome. The other four simulations employed virtually iterated games. It was shown that the genetic influences were larger for the games with smaller number of iterations. The implication for the evolution of individual differences in prosociality will be discussed.

### **2.10. Misato Inaba & N. Takahashi**

Comparison of the effects of exchange form on social solidarity.

Social solidarity refers to the ties in a society that bind people to one another. Social solidarity enables members of the society to contribute to a common good and solve social problems. Because of its importance, social solidarity has been one of the major research topics in social sciences. However, what produces solidarity and how it works for producing solidarity have not been fully investigated. We examined the process of promoting social solidarity from the perspective of social exchange theory. The first research adopting such a perspective was conducted by Lévi-Strauss (1949) who investigated the marriage system in primitive societies. He regarded marriage as an exchange process between social units and claimed that certain forms of marriage system can integrate a society by promoting solidarity. Following Lévi-Strauss, Ekeh (1974) classified exchange forms into two types: restricted exchange and generalized exchange. He claimed that the integration effect is limited to generalized exchange that involves more than two players. To investigate this claim, several studies have been conducted (e.g., Gillmore, 1987; Lawler, Thye & Yoon, 2008; Molm, Collett & Schaefer, 2007). However, their findings were not consistent. Therefore, we conducted an experiment to examine whether experiencing different forms of social exchange produces different levels of solidarity. We compared four forms of social exchange: reciprocal exchange, negotiated exchange, pure-generalized exchange (giver can choose recipient) and chain-generalized exchange (giver cannot choose recipient). Two dimensions classify these exchanges: the number of players (two vs. more than two), and involvement of negotiation. Reciprocal and negotiated exchanges occur within dyads, while pure- and chain-generalized exchanges involve three or more players. Only the negotiated exchange involves negotiation process, the other exchanges are purely unilateral giving. In our study, participants played a one-shot social dilemma (SD) game before and after social exchange session. The more the players cooperate in SD game, the stronger the social solidarity. Results showed that the cooperation rate in SD game increased more in the reciprocal, pure- and chain-generalized exchange conditions than in the negotiated exchange condition, suggesting that social solidarity is facilitated not by experiencing generalized exchange but by experiencing social exchange which does not involve negotiation. In exchange without negotiation, there is no guarantee of reciprocation. Recipients would attribute givers' behaviors to their nature in these forms of exchange, leading higher cooperation rate in SD game afterward.

### **2.11. Junhong Kim**

Cultural evolutionary process of human cooperation.

The proposed project will explore mechanisms of large-scale cooperation in human society from an evolutionary perspective. To date, major evolutionary theories such as kin selection, reciprocity, and mutualism fail to explain

large-scale cooperation in humans. These theories failed because 1) they ignored the fact people internalize cultural norms and punish norm violators and, 2) due to heavy dependence on culture, group-level adaptation is present in humans whereas it is rare or absent in other animals. Novel social environment since the wake of cumulative culture has generated coevolution of gene and culture and this coevolution has shaped a psychology that can reap the rewards of social life. Cultural group selection incorporates these findings and can explain large-scale cooperation in humans. The objective is to test hypothesis derived from cultural group selection theory. The first task is to find population structure and to see whether there is enough variation of prosociality among groups (roughly, neighborhood). For this purpose, I will use a survey, ethnographic method, and dictator game. The second task is to examine whether taste for punishment differs among neighborhood using third party punishment game. Since individuals have internalized different local norms during developmental period via interaction with immediate neighbors, I expect that individuals from different neighborhood have different level of punishment.

## **2.12. Kristen Knowles & J.E. Lycett**

Perceptions of cooperation and trust in the human voice.

The human voice is used to communicate a wealth of information about the speaker beyond words themselves, including physical dominance, attractiveness, emotional states, and personality traits of the speaker. Men have been shown to alter their voice based on competitive context; no study has yet examined changes in the voice based on cooperative contexts. This research examines human voice characteristics across the pro-social contexts of reciprocal altruism and mutual-benefit cooperation using scripted speech, and aims to examine what vocal properties in particular influence rater perceptions of trustworthiness, cooperativeness, and attractiveness. Men were recorded speaking three different scripted texts reflecting varied context. Exploratory analysis of vocal parameters revealed a significant change in harmonics-to-noise ratio (H/N), an acoustic measure of "breathiness", between neutral and cooperative contexts, however, ratings of these voices were not influenced by H/N. Overwhelmingly, ratings data revealed significant effects of voice pitch on cooperativeness ratings, with higher-pitched voices given higher cooperativeness scores than lower-pitched voices. This is the first study to examine perceptions of cooperativeness in the human voice, and one of only a few to include free-flowing speech as opposed to isolated vowel-sounds as stimuli for ratings. This result is consistent with research that shows that men with lower-pitched voices are perceived as more masculine than men with higher-pitched voices, and that masculine traits are associated with antisocial behaviour.

## **2.13. Florian Lange, M. Luckhof & F. Eggert**

Please, go ahead! – Generating field evidence for indirect reciprocity.

Whereas the increasing interest in human cooperation and altruism has inspired a large body of computer simulations and internally valid experiments under controlled laboratory conditions, conclusive field data is still lacking. In order to pave the way for more externally valid inferences, we examined the appropriateness of a "real-world" setting to investigate the predictions of image-dependent indirect reciprocity (Nowak & Sigmund, 1998). In a German supermarket, one of a number of confederates of the experimenter lined up at the checkout appearing to buy a single item (a 0.5 liter bottle of mineral water or a corresponding amount of beer). The waiting person in front of the confederate (i.e., the experimental subject) could, as a potential donor in an altruistic act, let the confederate go ahead which obtained a benefit for the confederate and a cost for the experimental subject (defined as waiting time). The number of items bought by the experimental subject and his/her behavior, as well as the number of observers of the situation were recorded. The frequency of cooperative behavior did not depend on the subject's age or gender, the instated confederate or the number of observers. Results showed, however, that the relative frequency of cooperation increases with increasing benefit for the confederate. A simple manipulation of the recipient's image (water vs. beer) appeared to alter the range of accepted cost-to-benefit-ratios for the cooperative act. As postulated by indirect reciprocity theory, the decision to cooperate in one-shot interactions with strangers could be shown to depend on the cost-to-benefit-ratio as well as on the perceived image of the potential recipient. The investigated field paradigm provides the possibility to examine the impact of further image manipulations, ranging from the recipient clothes to watching the recipient helping a third person, which can be measured and compared in a quantitative variable: the range of accepted cost-to-benefits-ratios.

## **2.14. Stephen Le**

Societal trust, geographical latitude, and evolution.

Societies that are located in colder climates tend to be more trusting, according to a frequently used 'general trust' item from the World Values Survey that polled around 1,000 people in 99 geopolitical regions over five 'waves' of questionnaires. No clear explanation has yet been offered for this pattern. This pattern occurs both globally, and within sub-regions such as Europe, Africa, South America, and the ex-Soviet Bloc countries. The correlation between latitude and trust is also robust to use of indicators of trust other than the WVS general trust question. Regression and structural equation model results support the hypothesis that societies located in colder climates have greater societal stability, due to a circle of mutually reinforcing societal characteristics, including less disease prevalence, less income inequality, less ethnic heterogeneity, greater wealth, greater life expectancy, less religiosity, less corruption, and greater trust. The individual effects of these characteristics can be explained using a combination of evolutionary and economic theory.

## **2.15. Rie Mashima & N. Takahashi**

How do people evaluate different types of sanctioners?

Although sanctioning is a well-known solution for social dilemmas (SD), the 2nd-order problem – why people engage in costly sanctioning – still remains as a theoretical puzzle. Recent empirical studies showed the possibility that costly sanctioning can be adaptive because sanctioners can acquire positive reputation from other people more than non-sanctioners (e.g., Barclay, 2006; Nelissen, 2008). However, because previous studies have not distinguished among various types of sanctioning, which type of sanctioning produces which kind of reputation is not yet fully understood. The purpose of the current study is to measure reputation of sanctioners and non-sanctioners for an exploratory examination of the adaptive basis for sanctioning behaviors. We conducted a vignette experiment in order to measure people's evaluations toward various types of sanctioners. Respondents were asked to read two scenarios of SD and answered questions regarding the characters in the scenarios. The first scenario describes a character who sanctioned in a SD, and the second scenario describes a character who did not sanction in the same SD situation. We used a 3 by 2 between-subjects factorial design. The first independent variable is the sanction method (punish / reward / ostracize), and the second independent variable is the sanctioning entity (individual / collective). While the character individually decided whether or not to sanction another person in the individual conditions, the character decided whether or not to contribute to a sanctioning system in the collective conditions. After reading each scenario, respondents were asked to answer their impressions toward the target person (a sanctioner or a non-sanctioner). Results showed that both punishers and rewarders were positively evaluated as "a trustworthy person who is suitable as a leader", while punishers were evaluated as a person who is easily angered and whom respondents want to keep at a distance. Ostracizers (people who ostracized SD defectors) were not evaluated positively. Furthermore, sanctioners who engaged in collective sanctioning were evaluated more positively than those who engaged in individual sanctioning. These results suggest that there may be different adaptive bases for different sanctioning behaviors.

## **2.16. cancelled.**

## **2.17. Daisuke Nakanishi & K. Yokota**

The effect of intergroup conflict on ingroup cooperation and conformity – simulation and experimental data.

Previous research has shown that ingroup favoritism tends to evolve in intergroup conflict situations. However, theoretically, the free-rider problem remains even in such intergroup conflict situations. In this study, based on multilevel selection (MLS) theory and cultural group selection theory, we hypothesized that conformity (frequency-dependent bias) may contribute to resolving the free-rider problem. Based on MLS theory, it can be argued that intergroup conflict situation is one of the factors that group-level selection is almost invariably stronger than individual-level selection. In cultural group selection theory, conformity works to enhance the difference among groups because of intragroup similarity and intergroup distinctiveness on a strategy. This mechanism may give more advantages to cooperative groups and more disadvantages to non-cooperative groups. As a result, high cooperative groups survive, and severe intergroup conflicts develop. That is, conformity contributes to intensifying intergroup conflict where ingroup favoritism strategies are likely to be profitable. To test this hypothesis, we conducted an agent-based simulation and a vignette experiment study. The results of an evolutionary simulation revealed that ingroup favoritism and conformity can evolve under low to middle levels of

intergroup conflict. However, in high level of intergroup conflict situation, both strategies are stable in a high rate. Furthermore, support for this hypothesis was found in a vignette study examining ingroup cooperation and conformity under differing levels of intergroup conflict, showing that ingroup cooperation and conformity increase with greater intergroup conflict. We discuss the implications of the MLS model.

## **2.18. Yohsuke Ohtsubo & E. Watanabe**

Self-punishers have a bad reputation.

Recent studies have revealed that people who have committed some transgression and then felt some aversive emotions (guilt, shame) are willing to inflict a self-punishment (Nelissen & Zeelenberg, 2009; Watanabe & Ohtsubo, 2010). One adaptive function of the self-punishment is to maintain unintentional transgressors' reputation. For example, models of indirect reciprocity under noisy environments assume that cooperators restore their reputation after erroneous defection by playing the unconditional cooperation in the subsequent round (Ohtsuki & Iwasa, 2006). The unconditional cooperation, which entails accepting a partner's defection once, is considered a form of self-punishment. Watanabe and Ohtsubo (2010) investigated whether people would inflict a more straightforward form of self-punishment (i.e., reducing their own monetary reward) after behaving unfairly in the dictator game. Approximately, half of their participants, who strongly held an egalitarian attitude, inflicted the self-punishment. Although the self-punishment in Watanabe and Ohtsubo's study was conducted in a completely private manner, audiences of the self-punishment, if any, would attribute a good reputation to the self-punishers than the non self-punishers. The present study investigated whether the self-punishers in fact have a good reputation than the non self-punishers. The participants in Watanabe and Ohtsubo's study were asked to participate in a new study regarding friends' impressions of them. Twenty five of the original 42 participants agreed to serve as the targets of the impression rating experiment. The targets gave five of their friends a questionnaire that was designed to assess each friend's impression of the target. The responses were obtained from 57 respondents (i.e., 3.17 friends of 18 targets) after discarding four responses apparently made by a single respondent (the valid response rate was 46%). The rated 18 targets consisted of 8 self-punishers and 10 non self-punishers. The results disconfirmed the prediction: The non self-punishers were rated (on a 5-point scale) rather significantly more trustworthy and cooperative than the self-punishers: mean trustworthiness ( $SD = 4.65 (.35)$  and  $3.88 (.50)$  for non self-punishers and self-punishers, respectively,  $t(16) = 3.84$ ,  $P < .001$ ; mean cooperativeness =  $4.41 (.42)$  and  $3.68 (.42)$ ,  $t(16) = 3.84$ ,  $P < .001$ . A possible interpretation of the results is that those who have worse reputations (and thus are at the risk of being socially excluded) are more prone to inflict a self-punishment after a minor transgression because restoring reputation has greater importance for them than those who are not at the risk of social exclusion.

## **2.19. Linda Olah-Szijjarto & T. Bereczkei**

Who trusts, who reciprocates, and who retaliates?

Machiavellianism is a combination of a behavioural strategy characterised by the tendency to manipulate and exploit others, and a worldview resting upon cynicism and opportunism. The aim of our study was to explore the extent to which highly machiavellian people tend to trust others, reciprocate favors, and retaliate in answer to the harm they receive from others. To model everyday relationships, we used the so-called Trust Game: a two-person experimental situation in which participants took part with a stranger as a partner. 144 university students took part in the study, who played for real money. Their level of Machiavellianism was measured by the Mach IV-Questionnaire. Our results show that there is no significant difference in the deposits made the first players between high and low Machs. We found, however, that as second players, high Machs tend to reciprocate the favors of the other player to a lesser degree than low Mach participants. The results also indicate that highly Machiavellian people don't show a tendency to retaliate in answer to the unfair offer made by the partner. We assume that Machiavellians make decisions with cool-blood; they do not feel injustice but always reciprocate a little, regardless the amount of money they received from the partner.

## **2.20. Ryoichi Onoda & N. Takahashi**

The emergence of in-group favoring behavior in indirect reciprocity setting.

Indirect reciprocity is one of the mechanisms that characterizes human society. Yamagishi, Jin, and Kiyonari (1999) have shown that people have the 'group heuristic,' which is the default expectation of indirect reciprocity within group boundaries. They argued that in-group favoring behaviors emerge as a consequence of the group heuristic. However, they have not yet provided a satisfactory explanation for why people have the group

heuristic. Takagi (1997) conducted a series of evolutionary computer simulations and argued that the in-group favoring strategy emerges spontaneously among agents who engage in social exchange. If this is really the case, it can be the theoretical explanation for the existence of the group heuristic. However, Takagi's study (1997) has its own limitation: simulation does not allow mutation of strategies. In other words, they did not show that the in-group favoring strategy can resist the invasion by other strategies (e.g., defectors, out-group favoring strategies, and indiscriminate strategies). The main purpose of the current study is to conduct a series of rigorous simulations to reexamine whether the in-group favoring strategy can be adaptive. Onoda and Takahashi (2010) are the first to investigate this theoretical possibility. They tried to reconstruct Takagi (1997) as much as possible, therefore they used the simulation setting that Takagi (1997) used, i.e., they used the giving game and constructed a society which was composed of two groups, A and B. In the giving game, each player was given a fixed amount of resources and had to decide how much and to whom he/she would give. However, this setting is different from the standard setting in indirect reciprocity in which each player is randomly matched with a recipient. Therefore, it is difficult to compare Onoda and Takahashi (2010) and the previous studies on indirect reciprocity. The current study will overcome this limitation by adopting the standard setting in indirect reciprocity research. Although they confirmed that in-group favoring behaviors emerge, their results showed that only strict in-group favoring strategies (not giving any resources to players who had helped other players who didn't adopt in-group favoring strategy) can be adaptive and help maintaining indirect reciprocity within group boundaries. Although we are still running simulations, we expect the same conclusion which supports the idea that in-group favoritism is a byproduct of the group heuristic that is adaptive in social life.

## **2.21. Phellipe Siqueira & Fivia Lopes**

What to look for in a friend?

Human beings are essentially sociable. The foundation of our sociability is cooperation. Thus, friendship, vital to the social, emotional and cognitive development of an individual, is configured as a result of selection for reciprocal altruism in humans. The period of young adulthood is considered very suitable and appropriate for the investigation of friendship relations. Therefore, this work's goal was to characterize friendship relations among undergraduate students. The study gathered 500 students from higher education institutions in the city of Natal – RN (Brazil), among them 250 women, averaging 24.1 years of age ( $\pm 7.66$ ) and 250 men, averaging 26.77 years of age ( $\pm 9.64$ ). Two questionnaires with anonymous and personal profiles were applied, the first being sociodemographic and the second dealing with desired characteristics in idealized friends, called "Ideal Friend's Characterization". We evaluated the degree of importance of the characteristics presented in the participants' process of choosing a friend of the same sex and of the opposite sex, and investigated patterns of choosing a friend based on self-assessment. In general, we found a preference for the characteristics "Fellowship" and "Sincerity" to ideal friends' profiles on social networks for college students, and it was possible to observe the influence of sex on the characteristics attributed to an ideal female friend, for which men appreciate the features "Beauty/Good Look" and "Intelligence" more than women, while those most valued features "Fellowship" and "Sincerity" than men. For the characteristics attributed to an ideal male friend, no differences were found between the sexes. Finally, it was observed a positive correlation between the participants' self-assessment and the preferences for the ideal friends' characteristics. Given the importance of friendship relations in human interactions, the methodology used in this study could reveal important clues for understanding friendship relations, specifically the process of choosing friends. The results reinforce the importance of studying friendship relations towards a better understanding of human social behavior.

## **2.22. Adam Sparks**

How do subtle cues of social presence influence cooperation?

Recent studies have reported more cooperative behaviour by participants experimentally exposed to images of eyespots or faces than those exposed to control images. These results are commonly interpreted as evidence for (1) the role of reputation in the evolution and maintenance of human cooperation, and (2) the influence of subtle social cues on the outcomes of economic games experiments. I report the results of three economic games experiments in which participants exposed to images of eyes were no more generous (and in one case were significantly less generous) than those exposed to images of landscapes. I discuss how these results may have been affected by aspects of experimental stimuli and game structure, and the relationship between involved parties.

### **2.23. Kyle Thomas, P. DeScioli & S. Pinker**

Common knowledge and coordination.

Common knowledge is a well-developed concept in game theory, philosophy, and economics, yet despite its necessarily psychological nature, little work has been done on its psychological basis outside of psycholinguistics. Common knowledge is commonly invoked as an important element in coordination problems, and some famous proofs show that in an analytical sense it is necessary for coordination problems where decisions are made simultaneously. Importantly, in these models even high-level shared knowledge in which individuals have many levels of recursive representations of both what they and their partner know, what each knows about what the other knows, and so on, is analytically equivalent to having no knowledge at all. We present some of the first psychological evidence relating to this large body of work. Evidence from an experimental economics paradigm is presented showing that, contrary to the analytical models but in line with psychological expectations, shared knowledge does facilitate solving coordination problems. However, in line with the models, common knowledge does still have an effect above and beyond that of shared knowledge, showing that there is something psychologically special about common knowledge that helps individuals coordinate for mutual benefit.

## **Group 3. Cultural evolution.**

### **3.1. Thomas Abel**

Cultural evolution in a nested hierarchy of ‘information cycles’: the case of conversation.

‘Culture’ remains a conundrum in anthropology. When recast in the mold of ‘information cycles,’ culture is transformed. New fault lines appear. Information is splintered into parallel or nested forms. Dynamics becomes cycling. Change is evolutionary. Energy and material artifacts are essential. And culture has function in a directional universe. The ‘information cycle’ is the crowning component of H.T. Odum’s theory of general systems. In an ongoing research program the information cycle is currently being applied to the cultural domains of enculturation, cognition, conversation, ritual, education, journalism, technology, and academia, which were never attempted by Odum. These forms of cultural information differ from one another in how quickly they degrade, how widely they are shared, and how much work is required for their construction (and reconstruction). Each scale of cycling is semi-autonomous, with its own evolutionary dynamics of production and selection in an information cycle. In information cycles, cultural information is perpetuated—maintained against Second Law depreciation. This paper reports the application of the information cycle in one study – an analysis of conversation among Taiwan students. The paper indicates how conversation can be illuminated as an information cycle, and located in a hierarchy of information production.

### **3.2. Elliot Aguilar & S. Ghirlanda**

Toward a cultural coalescent.

Over the past thirty years, a body of mathematical theory has been developed to describe the forward-time microevolutionary dynamics of cultural evolution, while more recently phylogenetic techniques have been applied to linguistic and archaeological data to explore the macroevolutionary process of cultural diversification. Little attention has been given to the effect of historical demographic events on cultural phylogenies. Not only does this have unknown consequences for our attempts at constructing cultural phylogenies, it also leaves us without ways of making historical demographic inferences from data on cultural diversity. Here we present the first steps towards a reverse-time model of cultural lineages that incorporates demographic parameters. Based on the following assumptions: (1) non-overlapping generations (2) constant population size, N (3) cultural traits are selectively neutral (4) individuals may have anywhere from 1 to N ancestors in the previous generation (5) no horizontal transmission, we derive the probability distribution for time to most recent common cultural ancestry for a sample of individuals from an extant population. We discuss the implications of this model for cultural diversity studies.

### **3.3. Nigel Barradale**

Social incentives and human evolution.

The evolution of uniquely exaggerated traits in humans is a topic that generates considerable interest and debate. In this article I present an integrated theory that is based on the relationship between the individual and the group. This relationship involves diverse incentives—rewards and punishments—being applied by societies to

their members, and these incentives create an evolutionary force. Direct incentives, like punishment for non-cooperation, have been considered as an evolutionary force previously. I propose an indirect incentive that is potentially far more powerful: social status. Through the awarding and withholding of social status, societies favor diverse psychological and morphological traits including intelligence, knowledge, norm-following, language ability, singing ability, and altruism towards one's group. Social status grants individuals proximate benefits in social interactions and ultimate benefits in inclusive fitness, at least in pre-industrial societies. Hence social status acts as a social incentive and is a component of a wider evolutionary force that I term prosocial selection. In discussing the social bases of prosocial selection, I highlight a form of democracy, with group members wanting incentive systems that benefit themselves, as well as a form of group selection, with groups possessing fitter incentive systems thriving before other groups. In discussing the psychological bases of prosocial selection, I highlight genetic predisposition, behavioral conditioning, awareness of intrinsic incentives, and awareness of social incentives. Finally, I discuss the altruism generated through prosocial selection, termed social altruism, and contrast it with established theories of altruism. As a coherent theory of the evolution of many human behaviors, prosocial selection requires a considered debate.

### **3.4. John O. Beahrs**

"Useful information" in human evolution.

"Information" is selective knowledge of reality by an observer. This concept bridges the physical with the life sciences. In physics, the word is applied either to coarse-grained macro-knowledge or "order" that always decays, or to unknowable micro-details that are believed to be conserved. In physical terms, living organisms have been defined as "information gathering and utilizing systems." "Useful information" is the type of information that organisms "gather and utilize" in the service of adaptation. It differs from the epistemic and objective types of physical information, in applying to the poorly defined domains of intentionality and attributive causation. Its basic unit is the "proxy", which both creates new information and condenses massive external and internal information into a representation. Examples include chemotaxis in amoebae, and identity markers in human beings. In all cases, there is an inherent tension between creating new information and economizing on it -- thereby balancing competing selective pressures to adapt and to conserve energy. Useful information is not quantifiable, for several reasons. Its content varies with its framing, or "meaning." "Too much" is equivalent to "too little" information, implying the existence of ill-defined points of optimization. Finally, it is limited by fundamental uncertainty, in which proxies' precision and relevance vary inversely. Evolutionary transitions can be understood as the emergence of new forms of useful information. Under some selective pressures, proxies "integrate" into complex higher-order proxies. Under others, they "differentiate" to fit more specific niches. With the evolution of sex, "life histories" emerge. With the advent of symbolic language, these are represented by story lines or "narratives." Cooperative cheating plays an under-appreciated role in the evolution of informational complexity, in both social amoebae and humans – where it is concealed by shared self-deception. Problematic for science, much human knowledge is objectified social agreement, and much of its overt content is unfalsifiable and influenced by non-declarative information that lies outside of conscious awareness. Some such belief systems can be tested by assessing their behavioral effects – their proxy value. An example is given, showing the adaptive effects of perceived "volition." Although illusory in physical terms, "free choice" is a high-level proxy that promotes human adaptation.

### **3.5. Chun-Chieh Chi**

The adaptive capacity of indigenous Taroko people's biocultural tradition in eastern Taiwan.

Since the 19th century, capitalist expansion has increasingly penetrated into the world's remote areas; this has been the case in Taiwan as well. In eastern Taiwan, since their ancestors migrated to the Taroko area from west side of the Central Mountain Range some 300 years ago, the Taroko people have relied on the mountain environment for sustaining their livelihood and culture. However, most of their lands were systematically appropriated first by the Japanese colonial government, and then the succeeding Chinese Nationalist government. Culturally, the Taroko people were forced to adapt to the dominant Chinese culture, to the extent that they were required to change their native name into Chinese name, and their children were forbidden to speak their mother tongue in school. Because of these economic-cultural colonization processes, the Taroko people, like other indigenous groups in Taiwan, have become the most disadvantaged people in Taiwan. The indigenous movements between mid-1980s and late-1990s have taken indigenous people of Taiwan one big step

forward toward reclaiming their rights and identity. In Eastern Taiwan, the Mugumugi bend of the indigenous Taroko people began to engage in collective community-rebuilding process in early 2000s. They brought forth declining cultural traditions such as collective decision making, weaving, knife making, and bow and arrow making. They also engaged in “invention of tradition” by applying their traditional ecological knowledge in river ecosystem management and in ecotourism operation. Since 2004, they have successfully attracted increasing number of tourists to visit their beautiful river gorge, learn their culture heritage, taste their local delicacy, and bought their handicrafts. Through this process, they have gradually rebuilt their community economically and culturally. This paper will describe and discuss about the aforementioned process, and offer anthropological assessments of the Mugumugi bend’s adaptive capacity, especially in their biocultural traditions, in light of their long colonial experience.

### **3.6. Maxime Derex**

Information scroungers, tool exchange and knowledge exchange: experimental simulations of cultural transmission.

Recently several studies using laboratories experiments have sought to simulate cultural evolution. Copying successful individuals is significantly more adaptive than individual learning. However some theoretical models suggest that cultural learning would be hampered by the emergence of free-riding information scroungers. A possible way to prevent the emergence of free-riding information scroungers would be to control the transmission of information toward other individuals. A recent study using a virtual experimental task shows that successful participants tended to prevent other group members from copying their information, significantly reducing the frequency of cultural learning. Otherwise, it has been suggested that many behaviours and skills cannot be copied without close proximity to, and interaction with the model. Here, using a complex virtual task, we sought to explore conditions which may favor cultural evolution. During the game, players have to design a fishing net using multiple parameters. Once the task is accomplished, they are given feedback on the success of their design. Importantly, the score of each fishing net depends not only on parameters but also on the building procedure. Five different conditions are explored: (1) Players have no interactions with other players and just see score of competitors; (2) Players have possibility to see score and the fishing net of other players for free; (3) Players have possibility to see score and building procedure of other players for free. Then we introduce the possibility for participants to differentially sell their fishing net or the building procedure when they are (4) in individual competition and (5) in group competition. Results are discussed in the context of the cultural evolution.

### **3.7. Ida Envall, S. Isaksson, P. Lindenfors & M. Wallenberg-Bondesson**

Evolution of culinary arts. An empirical study of long-term change in European cooking recipes.

We have carried out an empirical study of European cooking recipes to test a general hypothesis in cultural evolution: that cultural complexity increases over time due to a cumulative effect of knowledge. Data from seven cook books, the oldest one written in medieval times (~1200) and the youngest one dating from late modernity (1999), have been excerpted for the purpose of measuring and comparing their respective levels of complexity. We found a significant increase in the numbers of steps and separate processes required in each recipe, in the numbers of techniques and ingredients, as well as in the quantities in each recipe of both simple and complex semi manufactured ingredients. However, when correcting for the number of ingredients, the number of steps remains stable, indicating that the number of ingredients is the best explanation of why recipes get longer over time. Nevertheless, all other variables exhibited a significant temporal increase, enabling us to identify cooking as an example of the general trend of increased complexity in long-term cultural evolution.

### **3.8. Yuval Laor**

What is cultural fitness?

The common notion that evolution can be separated into biological evolution and cultural evolution assumes that there are two types of fitness, biological (or genetic) fitness, and cultural fitness. I argue that this assumption is problematic, and that while biological (genetic and epigenetic) inheritance can be separated from cultural inheritance, this separation cannot be carried over to different types of fitness. The problem with such partitioning is that the different inputs interact with each other in complex ways both during ontogenesis and over evolutionary time. As a result, the distinction between biological evolution and cultural evolution should be

undertaken with great care. To illustrate the problems with the concept of cultural fitness, I consider a common human trait: alcohol consumption, a trait that is sensitive to variations at the genetic, epigenetic and cultural levels. It is known that different populations react differently to the consumption of alcohol because of the different genetic variants their members carry. Native Americans, for example, have genetic constitutions that render them, on average, more sensitive to alcohol and more likely to develop addiction to it than individuals in northern European populations. Alcohol consumption is also highly sensitive to epigenetic inputs: young children and fetuses who are exposed to alcohol react differently to alcohol as adults than unexposed individuals. Finally, the trait of alcohol consumption is highly sensitive to cultural inputs: for example, in some cultures the consumption of alcohol is forbidden, while in others it is normative; moreover, the industries associated with alcohol can have strong effects of its consumption. After discussing "alcohol drinking" as an instructive example of the complex relations between different, potentially heritable inputs into the development and heredity of the trait, I show that this interactive view challenges the notion of cultural fitness. Although it may sometimes be possible to provide an estimate of the contribution of cultural variations to the heritability of the trait, the notion of fitness is best attributed to heritably varying phenotypic traits. I argue, that in this case, as in other cases (I briefly discuss the use of fire and literacy) a single notion of fitness, defined at the level of the heritably variable phenotypic trait, allows for a unified notion of fitness and highlights the developmental interactions between different types of inputs into development, heredity and evolution.

### **3.9. Luke McCrohon**

The generalized complexity hypothesis and diffusion between culturally coadapted systems.

Considered from a biological perspective human populations have the potential to differ both in terms of their genes and their cultures. Although in most cases genes and culture are transmitted in parallel to subsequent generations of a given population (Richerson & Boyd 2005), but culture also has the potential to be transmitted, independent of genes, between interacting populations. This process is commonly known as cultural Diffusion. Diffusion is perhaps easiest to see in linguistic data. In linguistics, following the work of Thomason and Kaufmann(1988), there has been growing acceptance that all types of linguistic information have the potential to diffuse between language groups (Aikenvald 2006). The data suggest that the probability of diffusion is dependent on the particular class of linguistic information. Based on observed patterns, several "Borrow-ability Hierarchies" have been proposed, each ranking lexical and grammatical classes in order of their propensity to diffuse (Curnow 2001, Haspelmath & Tadmor 2009). Diffusion also occurs in biology between species, where it is commonly known as horizontal transfer. Similarities with diffusion extend to include biological hierarchies of transferability (Rivera et al. 1998). These hierarchies are in terms of gene function, rather than lexical/grammatical class, and have been reported for both eukaryote and prokaryote species. The leading explanation that has been proposed to account for them is the so-called Complexity Hypothesis (Rivera et al. 1999). Simply put, this hypothesis suggests that genes involved in complex interactions with other genes in their native species, are less likely to be horizontally transferred. In this paper we argue that the complexity of a gene's interactions is simply a measure of its degree of coadaptation to other genes in that particular species. Based on this, we generalize the complexity hypothesis to a general darwinian principal. One that applies not only to biology, but to any darwinian system in which replicators form interacting coadapted populations. In this paper we investigate the application of this generalized complexity hypothesis to the cultural diffusion of lexical items between languages. Our investigation makes use of a computational simulation of two populations of agents which have been allowed to evolve separate languages. Both languages contain lexical items coadapted to varying degrees with other items from their own language. We analyze the consequences of bringing these populations into contact in terms of the predictions made by the generalized complexity hypothesis. This analysis informs a discussion of Aikenvald's (2006) suggested list of factors facilitating diffusion.

### **3.10. John McCullough, K. Heath & A. Smith**

Gene-culture co-evolution of the European Neolithic niche construction: lethal genetic consequences for modern populations.

The Agricultural Revolution changed life for Europeans in many ways, including work habits, population expansion, settlement permanence, but nowhere more strongly than in the diet. Unlike the earlier hunter-gatherer diet based largely on meat, fish, tubers, nuts, fruits, and vegetables, rich in iron and other nutrients, the European Neolithic diet shifted to a heavy reliance on grains and milk products. The increase in lactose

persistence in Northern Europe is well known. In addition, genetic modifications associated with the Neolithic diet appear to be linked with modern day leaky gut syndrome. Here we suggest there are other genetic changes affecting health. Grains and milk are foods that are deficient in iron as well as fail to chelate dietary iron (thus making it metabolically unavailable). Under such conditions, a mechanism to preserve what little iron was ingested would be an evolutionary advantage. Here we show that the hemochromatosis (HFE) C282Y mutation, which causes excess iron retention, was an adaptation to the iron-deficient diet of milk and grains but is now a common lethal gene among modern Northwest European populations. Thus the drastic dietary changes generated by domestication produced a domino effect on the human genome well beyond mere lactase persistence.

### **3.11. Ignasi Paster & A. Picin**

Social use of technology and human evolution.

*Homo sapiens*, the only extant species of the genus *Homo*, possess common behavioural patterns shared with extinct members of our lineage. There is a consensus that technology has been a significant driver of change and progress in human evolution. We should point out that social behaviour in all members of *Homo* has been developed in a technological context. Socialization is a basic process used by most of the mammal species to interact with their kind. In our opinion, almost since the earliest use of flaked stones, ca. 2.6 Ma (Gona, Ethiopia), the process of socialization in the *Homo* lineage and the technological development work together. Once this process has started, there's no turning back. The archaeological record suggests that all the subsequent species of the genus *Homo* increased their sociality and cooperation, always in relation with the increase of technology. Here, we show a set of published data about raw material procurement, technical sequences and cognitive skills inferred from flaked stones, and evidences of subsistence patterns to frame the increase of cooperation in early *Homo*. On the other hand, there is no evidence out of Africa of human presence without flaked stones. It is probable that our ancestors developed in Africa an unprecedented form of socialization among the individuals inside and outside the groups, based in a social use of technology, permitting their posterior dispersals across Eurasia. Humanity runs on socialized technology, but what social and behavioural evolutionary processes followed in the *Homo* clade to develop the social cooperation, commensurate with the collective products of *Homo sapiens*? Social use of technology, and specifically socialization through technology, may be useful for understanding the increase of sociality through hominin evolution. This question raises interesting topics regarding the emergence of certain new technologies, and corresponding social reorganization of *Homo* communities in changing behaviours, but also social, cultural and economic strategies. Social usage of technology is one of the factors that have allowed humans to progress, and we warrant further investigations in early *Homo* behaviour to understand this process and to prospect for our ultra-sociality as *Homo sapiens*.

### **3.12. Carsta Simon, F. Eggert & W. Baum.**

Memes - the new ghosts in the machine? To what extent does the concept of meme contribute to a scientific account of cultural practices?

Meme theories attempt to formulate a scientific account for the spread of cultural practices. Memes constitute units of culture which are said to be naturally selected. There is vast disagreement about the nature of these units of selection. Most proponents see them either as neurological patterns or abstractions, such as representations, information and ideas that underlie cultural practices. Another approach is to regard behavioral units to be selected directly. I argue that the latter, the behavioral approach, qualifies much better for a scientific theory than the view of memes as neuronal patterns or abstractions does. Reasons are that, due to the lack of structural similarities of neurological patterns, several of them can only be said to correspond to one meme by correlating them with behavior that is grouped as equivalent. When viewing memes as ideas, information, or mental representations further inquiry is inhibited by inventing a mysterious explanation. This leads to questions such as 'how the abstractions can cause behavior', which are left unanswered. The approach thereby creates more problems than it solves. Regarding memes as merely theoretical entities would potentially result in a sound scientific theory if it allowed for better predictions than merely regarding behavior. This has not been shown to be possible yet. The behavior from which the meme is derived serves equally well as a source for prediction. Consequently, I consider the supposition of a cultural analog to the biological genotype to be inadequate. Units of cultural behavior are passed on and selected directly; the mental and neuronal structures are unnecessary to any account.

### **3.13. Cory Stade**

On the intermediate stages of the evolution of language.

On The Intermediate Stages of the Evolution of Language Cory Stade (c.stade@ucl.ac.uk), BA Linguistics (Simon Fraser University), MSc Palaeoanthropology and Palaeolithic Archaeology (University College London) This presentation argues that syntax in language, as well as language as a whole, evolved through an incremental process of natural and cultural selection. Current research does not fully address intermediate stages of language after the introduction of syntax and before what can be called modern human language. This is due in part to researchers' assertions that a stage between protolanguage and modern human language could not exist, as well as assertions by others that language emerged abruptly. Describing syntax as having an abrupt emergence suffers from the same problems highlighted by Pinker and Bloom regarding arguments for the abrupt emergence of language as a whole; that language exhibits the hallmarks of selection, being a complex multi-componential system with a specialised purpose. Gradualists approach language as having evolved through a gradual development by natural and cultural selection pressures, and view abruptist arguments as being biologically unlikely. Gradual theories provide mechanisms that explain the emergence of certain linguistic features, such as hierarchical structure to explain the emergence of basic grammatical categories. A hypothetical stage of language called 'semilanguage' will be examined as a part of the development between Bickerton's protolanguage and modern language, and it will be stressed that language as well as the emergence of syntactic structure in language, should be thought of as a multi-faceted ability that requires a gradual evolutionary emergence.

### **3.14. Luc Steels**

Minimizing cognitive effort is one of the key drivers of cultural language evolution.

Even though there is a consensus today that language is based on an interplay of social, biological and cultural evolution, the key drivers for the origins of human language and the respective role of each level of evolution remains one of the key unsolved puzzles of human evolution studies. This paper argues that the origins of many (but not all) aspects of grammatical structure can be explained if we assume that the speaker tries to minimize the cognitive effort for the hearer so as to increase the chance of communicative success. This requires not only a cooperative attitude from the speaker but also the ability to simulate the effect of utterances on the hearer by self-monitoring, and to expand or adapt linguistic structure in order to optimize comprehension processes. The hearer also needs a kind of re-entrance facility to make educated guesses of novel linguistic material introduced by the speaker, based on the assumption that the speaker tries to be maximally relevant and cooperative towards the communicative goals of the interaction. The paper presents a cognitive architecture that supports this kind of meta-level processing as well as a number of case studies demonstrating its adequacy, based on computational models in which artificial agents (embodied as physical robots) play language games about the shared situations they encounter (Steels, 2011). The agents are endowed with several basic cognitive functions that they can recruit for language but not with a concrete lexicon, grammar nor a conceptual system. These have to emerge and become coordinated among the agents. This talk focuses in particular on the origins of word classes, syntactic hierarchy, and agreement systems. Word classes (such as the distinction between noun and verb) are hypothesized to emerge in order to signal more clearly to the hearer the semantic function of the meaning expressed by a word. Hierarchical structure (such as phrase structure) comes about by the need to explicitly signal how meanings contributed by individual words are to be combined. And agreement systems (such as agreement for number, person and gender between article and noun in French) are one of the ways in which hierarchical structure is being expressed. Steels, L. (ed) (2011) Experiments in Cultural Language Evolution. John Benjamins Pub, Amsterdam.

### **3.15. Maria Wallenberg-Bondesson**

Penal evolution: political legitimacy theory revisited - a comparative study of legal codes from three pre-modern societies.

What has been the direction of penal development over time? In the end of the 19th century Émile Durkheim developed a basically linear model of penal evolution. In primitive cultures, he claimed, the law was predominantly directed towards punishing violations of norms. Punishments were often severe and directed towards the body of the offender. Over time, however, penal policies became increasingly focused on the improvement of offenders and the punishments that remained were milder. Now we know that this model is inaccurate in many ways. In the 1960's to the 1980's a curvilinear model was instead discussed with some

frequency. Steven Spitzer did, for instance, identify the essential features of what he calls the Political Legitimacy Hypothesis. In this view, human society has moved from more lenient penal policies, to a stage of much more harsh penal practices, and back again to more moderate punishments. The central argument of Political Legitimacy Theory is that penal development is closely associated with the processes of political evolution. The middle stage of penal development of the curvilinear model – the most severe phase – is, furthermore, associated with societies in early stages of state development. What brings about a peak in penal severity at this point is, Spitzer claims, the problem of the legitimization of power in newly formed states. We have tested this hypothesis on a data set containing complete quantifications of the topics and consequences of the regulations of three pre-modern legal codes. We have investigated the types and frequencies of capital punishments and other corporal punishments prescribed in the codes. The result does, in most parts, conform to what can be predicted by Political Legitimacy Theory and the curvilinear model. More research is, however, needed to test this hypothesis further. Among other things, we need to know more about how the codes as political tools are related to codes as science, scholarly products, tradition, literary genres and sacred or authoritative texts. For this, it is necessary to study cultures such as the ones here on longer terms: to follow the development of their legal texts over long periods of time.

### **3.16. Olaf Witkowski**

Can cultural adaptation lead to evolutionary suicide?

In evolution, adaptations for the benefit of individuals do not necessarily benefit the survival of the group as a whole (Haldane 1932). A number of theoretical models have even predicted that occasionally individual selection may lead to initially stable populations becoming extinct. This phenomenon is closely related to the tragedy of the commons (Hardin 1968), and is commonly known as evolutionary suicide (Matsuda and Abrams 1994, Ferrière 1999, Gyllenberg et al. 2002). Typically, evolutionary suicide occurs when individual competition leads to the depletion of a resource on which all individuals depend, lowering the overall fitness of the group to a point where it is no longer able to survive the challenges presented by its environment. Whilst the phenomenon has been modeled extensively using adaptive dynamics, empirically testing biological adaptations to find how they cause extinction has remained a highly complex task (Rankin and Lopez-Sepulcre 2005). In this paper we seek to study the mechanics of evolutionary suicide in the context of culturally evolving systems. While such systems share many similarities with their biological counterparts (Boyd 1988, Deacon 1997), they generally allow for simpler data collection. Also, due to the faster rate of cultural evolution, such systems allow adaptations and their eventual consequences to be observed over far shorter time spans. In our study, we look at different instances of culture evolution in which specific traits appear and spread through a population, eventually driving it to extinction. First, using a corpus of historical linguistic data, we examine the evolution of euphemisms changing over time into taboo words (Quine 1987). Second, we investigate grammaticalization, the unidirectional process by which lexical items transform progressively into objects serving a grammatical function (Heine and Kuteva 2002). Finally, we consider several other cultural traits, such as clothing fashion and jokes. All these processes are argued to be examples of cultural evolution where individual adaptations have reduced their overall evolutionary stability, eventually leading to their evolutionary suicide. In each case we study the adaptation resulting in the collapse, showing in general that nothing else is responsible for the extinction of the population but the bifurcation created by the initial adaptation. The results not only are relevant to the field of cultural evolution, but may also benefit evolutionary biology.

### **3.17. Matthew Zimmerman**

Why the origins of human warfare is most likely cultural.

The evolution of war is hard to explain because individuals take potentially large risks for the benefit of their group. There is on-going interest as to how much of humans' propensity to engage in warfare is based on processes of genetic transmission (e.g., Cosmides and Tooby 1988, Peterson and Wrangham 1996, Choi and Bowles 2007), cultural transmission (e.g., Mead 1940, Rapoport 1999, Kelly 2004) or a gene-culture co-evolutionary process (Richerson and Boyd 1999). Choi and Bowles (2007) describe a computational model that demonstrates the feasibility of genetic origins of intergroup violence, though their model does not predict warfare for groups of more than ~40 individuals. However, since the advent of agricultural civilizations, human warfare has involved groups from thousands to millions (Gat 2006). Two hypotheses have been proposed to explain this expansion of warfare. The first, "great mistake" or "mismatch" hypothesis supposes that humans

evolved a propensity for warfare based on genetic kin selection and, now that humans live in larger societies, they interpret these large non-kin groups as kin. This hypothesis is often made implicitly, but can be explicitly acultural (Cosmides and Tooby 1988). The second hypothesis supposes that large-scale human warfare is possible because the properties of cultural transmission systems make cooperation more likely in large groups (Boyd and Richerson 1985, Henrich 2004). I argue, with a simple mathematical model and empirical measurements of cultural and genetic similarity (Bell, et. al 2007, Hill , Langergraber, et. al, 2011, Hill et. al, 2011) that the balance of evidence supports the latter hypothesis.

#### **Group 4. Development and life history.**

##### **4.1. Triin Anton & B. Ellis**

Cluster analysis of developmental pathways of divergent reproductive strategies.

The purpose of this research was to attempt to classify children into meaningful clusters based on the variables specified by the Developmental Pathways of Divergent Reproductive Strategies model (BSD model; Belsky, Steinberg & Draper, 1991). Based on life history theory, the BSD model makes explicit predictions about ecological/family characteristics in the first five to seven years of life that should channel subsequent maturation and sexual behavior. Derived from the BSD model, we expected to identify two clusters of children, those whose early childhood ecologies and parenting could be characterized as harsh and unpredictable versus those whose experiences were relatively harmonious and stable. The sample for this analysis was selected from a large, multi-site intervention (fasttrackproject.org) designed to prevent antisocial behavior (N=1199). Family context was evaluated using: SES, number of moves, parental transitions, and marital harmony/discord using the Relationship Adjustment Scale (28-item measure that evaluates satisfaction in the relationship of partners). Parenting was represented with the Parenting Questionnaire (27-item measure with subscales of: warmth, harshness, appropriate discipline and consistency between parents). A hierarchical agglomerative clustering technique was used with Ward's method for linkage between clusters (Aldenderfer & Blashfield, 1984). Examination of a dendrogram indicated a two cluster solution. Participants were split 47% in cluster 1 and 53% in cluster 2, boys and girls were represented equivalently. Analysis of variance indicated that participants in cluster 1 had significantly ( $p<.05$ ) lower mean scores on: consistency of parenting, warmth of parenting, appropriate discipline and the Relationship Adjustment Scale as well as significantly higher mean scores on harshness of parenting and more parental transitions. Based on these post-hoc analyses, cluster 1 and 2 appear to be analogous to Type I and II in the BSD model; the BSD model proposes specific developmental outcomes in terms of somatic growth and reproductive behavior for both Type I and Type II children. It was found that participants in cluster 1 had a significantly earlier sexual debut and significantly more pregnancies and children by age nineteen. As an indicator of criterion validity, children who had been previously identified as "at risk" based on behavioral and family measures (independent of LH theory or the BSD model) were significantly over-represented in cluster 1,  $\chi^2(1,1199)=13.9$ ,  $p<.05$ . In summary, it appears there is strong evidence that certain ecological and family conditions are closely related and can be used to group children into meaningful clusters specified by the BSD model.

##### **4.2. Jeremy Atkinson, R.N. Pipitone, A. Sorokowska, P. Sorokowski & M. Rowe**

A clean measure of pubertal androgen exposure: wrist width predicts reproductive success, risk taking, vocal parameters, sexual behaviours and facial sexual dimorphism.

Although 2D4D provides researchers with an assay of prenatal hormone exposure there is no simple, skeletal measure of pubertal hormone exposure currently used by researchers. Other measures, such as waist (or shoulder) to hip ratio are confounded with soft tissue and change over time. Wrist width (WR) is an excellent marker of skeletal mass, highly sexually dimorphic, uncorrelated to body composition (fat or muscle), immune to senescence and easy to assess. Three studies found that WR was not correlated to 2D4D, predicted reproductive success in an indigenous population as well as sexual behaviours, risk taking and ratings of facial masculinity, vocal parameters and other sexually dimorphic features in 2 western populations. Additionally, WR is not a ratio constructed measurement and thus it is easy to remove the effects of allometric scaling (IE height and/or size) by using residualized WR, creating a scale free measure of pubertal androgen exposure.

#### **4.3. Konika Banerjee, O. Haque & E. Spelke**

Melting lizards and crying mailboxes: children's preferential recall of minimally counterintuitive concepts.

Previous work with adults suggests that a catalogue of minimally counterintuitive concepts (MCI), which underlies supernatural or religious concepts, may constitute a cognitive optimum, and so enjoys a privileged representational status in iterations of cultural transmission, when compared to entirely intuitive concepts (INT) or maximally counterintuitive concepts (MXCI). The current study examines whether children, like adults, also demonstrate superior recall of MCI concepts, but not MXCI concepts, compared to INT concepts embedded in the context of a fictional narrative. 7-9 year old children who listened to a story including both INT and MCI concepts containing one (Experiment 1) or two (Experiment 2) violations of intuitive ontological expectations recalled the MCI concepts significantly more and in greater detail than the INT concepts, both immediately after hearing the story and one week later. However, MXCI concepts containing three violations of expectation showed no recall advantage over INT items (Experiment 3), suggesting that one or two violations of expectation may be a cognitive optimal for children, in the sense of being more inferentially rich and so more memorable, and that increased violations beyond this threshold diminish memory for target concepts. These results suggest that the cognitive bias for MCI ideas is present and active early in human development, near the start of formal religious instruction. This finding supports a growing literature suggesting that diverse, early-emerging, evolved psychological biases predispose humans to hold and perform religious beliefs and practices whose primary form and content is not arbitrarily derived from custom or the social environment.

#### **4.4. Abby Chipman & Ed Morrison**

Influence of kin networks and perceptions of risk on the desired age of first birth.

Previous research on contemporary childbearing from an evolutionary perspective has mainly focused on the variation in the age of first birth across socioeconomic gradients in western societies, including the UK. Such studies have predominantly identified the strong relationship between economic deprivation and early fertility. Less is known, however, about other mechanisms that mediate these neighbourhood differences in reproductive schedules and how these are expressed in adolescence. Survey data was collected from a socioeconomically diverse sample of students aged 13-19 in Hampshire (n=250+). The research explores (1) whether adolescents from neighbourhoods with higher rates of teenage pregnancy have earlier ideal ages of parenthood and (2) the extent to which kin networks (including grandparental investment, parental investment and families of choice); mating and reproductive risk taking; and subjective perceptions of environmental risk influence differences in the desired age of first birth.

#### **4.5. Masako Fujita & Eric Roth**

Mothers with low vitamin A status breastfeed daughters more often than sons in drought-ridden northern Kenya: A test of the Trivers-Willard Model.

The Trivers-Willard model predicts that natural selection should favor unequal parental investment between daughters and sons based upon consideration of maternal condition and offspring reproductive potential. Specifically, it predicts that mothers in good condition should increase investment toward sons while mothers in poor condition should favor daughters. Previous tests of the Trivers-Willard model in human populations overwhelmingly focused on maternal economic resources as maternal condition indicators. This paper tests the model using maternal nutrition – energy and vitamin A status respectively representing macro- and micronutrition – as the indicator for maternal condition, and 24-hour breastfeeding frequency recalls as the indicator for parental investment. We use our 2006 data from exclusively breastfeeding mothers (n=83) in drought-ridden Ariaal agro-pastoral villages of northern Kenya to test our hypothesis that mothers in poor condition will more frequently breastfeed daughters than sons. We defined poor maternal condition as having a body mass index (BMI) <18.5 or serum retinol (vitamin A) concentration <1.05umol/L, and applied a linear regression model using breastfeeding frequency as the dependent variable, respective maternal condition, infant's sex, and the maternal condition–infant's sex interaction as the predictors, and livestock ownership ( $y=1/n=0$ ) as the control variable for wealth. Results supported the hypothesis only in the vitamin A model. Maternal vitamin A status and infant's sex interact ( $p=0.046$ ) in their relation with breastfeeding frequency. The model predicts that low vitamin A mothers breastfeed daughters significantly more frequently than sons (10.0 vs. 5.0 times/day controlling for livestock) while vitamin A sufficient mothers breastfeed daughters and sons

equivalently (8.2 vs. 8.3 times). These results indicate that maternal nutritional status, particularly micronutrient status, can contribute to the investigation of evolutionary hypothesis of sex-based parental investment. Sponsor: NSF Dissertation Improvement Grant #0622358; the Wenner-Gren Foundation; the Micronutrient Initiative; Michigan State University Center for Statistical Training and Consulting.

#### **4.6. Dominick Grossi & E. Pillsworth**

Changes and variation in women's mating patterns and preferences: a life history perspective.

Much of the existing research on women's mating patterns and preferences has focused primarily or exclusively on women within a very narrow range of life history variables; that is, young, mostly nulliparous women with relatively little relationship experience. Yet women's mating strategies are expected to change as they transition through life history stages, both in terms of their overall preferences and strategies and the potential patterning of ovulatory- or fertility-based shifts. Across a woman's life, her current reproductive success and future reproductive potential are shifting, as well as her consequent value on the mating market. In addition, the mastery of complex human social skills continues throughout at least early life (Flinn & Ward, 2004), suggesting that women's abilities to assess and respond to specific tradeoffs may change with age, altering the patterning of mating preferences and/or decisions. The current study is an attempt to increase our understand of how the trade-offs that women face in mating decisions change as they progress through life, and how those tradeoffs may differentially affect women's mating decisions at different life stages. By evaluating the variables that establish a women's current reproductive condition (e.g. reproductive value, relationship status and satisfaction, parity, self perceived mate value, and fertility) and competency (e.g. experience) as a function of life history, this study will focus on how women adapt their mating patterns and preferences across the lifespan.

#### **4.7. Jessica Hehman & Daphne Bugental**

Stigmatization of those who are "too young" or "too old": evolutionary-based explanations for "stereotype challenge" vs. "stereotype threat"?

Both older adults and adolescents are subject to age-based stigma with respect to their presumed abilities. In a test of the effects of stigma, older adults and younger individuals (late adolescence) were told that a task (WAIS-III Block Design) required either (1) speed/contemporary knowledge (YA, "youth advantage") or (2) life experience/wisdom (OA, "age advantage"). Mean arterial pressure (MAP) changes were also measured in response to the task. Older adults in the YA manipulation showed greater MAP increases and lower performance than did those in OA manipulation (a stereotype confirming process, reflecting a "stereotype threat" response). The responses of late adolescents to the framing conditions were moderated by power attributions. Among those who attributed high control to powerful others, the OA advantage manipulation led to (1) MAP increases and (2) higher scores on the Block Design task (a stereotype disconfirming process, reflecting a "stereotype challenge" response). Evolutionary-based interpretations of the opposed responses of the two age groups (i.e., "stereotype challenge" response disconfirming the stereotype for late adolescents vs. "stereotype threat" response confirming the stereotype for older adults) will be discussed.

#### **4.8. Jernej Hribenik, A. Lewis, P. Kremer, E. Leslie, J. Toumbourou & J. Williams**

A life history model of female pubertal timing: the role of attachment and positive family environment. This research sought to extend prior work linking family rearing experiences with pubertal timing in girls, stimulated by Belsky, Steinberg and Draper's (1991) prediction [the BSD model] that negative rearing experiences would accelerate pubertal timing, with the converse being true of positive experiences. Path analysis was used to model psychosocial antecedents (family environment, childrearing and psychological) of variation in girls' pubertal timing in a large, cross-sectional, nationally representative Australian sample. Participants were 4125 students aged 10-14 years, recruited from 231 schools across three Australian states. Independent variables included family conflict, father absence/presence, socioeconomic status, parental support, attachment to father/mother and depressive symptoms. This study found additional support for an evolutionary model showing that parental support and positive parent-child attachment is associated with a developmental pathway which delays pubertal timing in females. However, the BSD model did not fit the data well and an alternative model was fitted in which parental support was associated with later female pubertal timing, and mediated by attachment to mother and low depression score. It was concluded that positive childrearing facilitates a developmental pathway to delayed menarcheal timing via current parental attachment. While these results cannot confirm the

direction of causality, they add to the body of evidence suggesting that a life history model of reproductive development provides a bio-psycho-social model informed by evolutionary theory which links psychological and somatic development.

#### **4.9. Laura Johnsen, D. Kruger & G. Geher**

Childhood neighborhood environment as a predictor of childhood injury, life history strategy, and sexuality.

This project explores the factors surrounding sex differences in childhood injuries and adolescent sexuality in an evolutionary perspective. Participants ( $N = 785$ , 612 female, 173 male) at two public universities in the USA completed a survey collecting basic demographics, perceptions of neighborhood safety in childhood, number of sexual partners, age at the first time of sexual intercourse, details regarding significant childhood injuries, and life history strategy (Mini-K). We predicted that higher neighborhood safety and family income in childhood would predict slower life history strategy, which would predict lower severity of childhood injuries, later age of sexual onset, and lower numbers of sexual partners. We also predicted that males would report faster life history strategies and more severe injuries, as men die at higher rates from behavioral causes than women across the lifespan (Kruger & Nesse, 2006). To test these predictions we created a parsimonious path model incorporating all significant relationships based on participants with complete data ( $N = 340$ , 269 female, 71 male. M age = 22, SD age = 6). Those growing up in safer neighborhoods indicated slower life history, slower life history predicted later age at first sex. Later age at first sex predicted a lower number of sexual partners. Higher neighborhood safety and family income also directly predicted later age at first sex. Men reported faster life history strategy and objectively higher severity of childhood injuries.

#### **4.10. Darcia Narvaez**

Human nature: the importance of early life experience.

Theorists often assume that contemporary societies provide appropriate baselines for extracting the nature of human nature. Thus, violence and self-centeredness are presumed by some to be genetic inheritances, evolved with the human genus. The contrary view emphasizes that gestational experience and caregiving practices in early life are highly influential in the formation of personality and character. Ancestral practices, documented among hunter-gatherers, but also evolved to fixation in social mammals more than 30 million years ago (thus termed ancestral human mammal milieu or AHMM), include lengthy breastfeeding, frequent touch, warm responsiveness to needs, free play in nature, multiple adult caregivers, and natural childbirth. In the USA, many of these practices have been abandoned to the detriment of the health and wellbeing of children and science maps the consequences. For example, formula fed infants have worse outcomes than breastfed babies on every front that has been examined (AAPBWGB, 1997; AAPSB, 2005). Lack of touch has detrimental effects on children's growth and development (Cushing & Kramer, 2005). Regular caregiver neglect through non-responsiveness to infant fusses and cries promotes the development of a stressed brain that is detrimental to physical, social and moral outcomes (e.g., Anisman et al., 1998). The paper postulates that species-typical behavior is better realized in the ancient developmental niche whereas the developmental manifold for Western children today promotes species-atypical behavior and detrimental outcomes for humanity. We examined the relation of the degree to which a child experienced the AAHM in early life and the child's capabilities in early childhood. Two studies ( $n=600$ , USA;  $n=300$ , China) used a parent survey to assess AAHM-consistent care for first three years of a child's life. Standard measures of child outcomes were used. We controlled for maternal education and income. Findings include the following. Breastfeeding initiation predicted non-aggression and competence at 24 months; positive touch predicted behavior regulation and social engagement at 18 months and intelligence at 24 months. Maternal social support predicted cooperation and competence at 18 months, non-aggression and intelligence at 24 months. Maternal responsivity predicted behavior regulation, social engagement, and cooperation at 18 months, and non-aggression, non-depression, competence and intelligence at 24 months. AAHM-consistent care related to greater cognitive, social and moral capabilities in early childhood. Like vitamins, each characteristic may have a unique effect but all together are needed for optimal development.

#### **4.11. Victor Shiramizu, W.T. Hattori & F. Lopes**

When attachment leads.

Interactions with the primary caregiver during the infancy and early childhood lead infants to organize a strategy of attachment, which subsequently will influence the various contexts of interpersonal relations, including romantic relationships. Romantic love is described in various cultural contexts, leading researchers to conclude that this would be universal among humans. The integration of evolutionary and social perspectives can help us in understanding why some of these relationships last longer than others. This study aimed to investigate the association of basic dimensions of attachment styles (anxiety and avoidance) to sociosexuality and to perception of love phenomenon by single individuals and those involved in romantic relationships. Participated in this study 26 men (age mean  $\pm SD = 26.19 \pm 15.18$  years) and 68 women (age mean  $\pm SD = 21.63 \pm 2.64$  years), 16 men and 34 women of them were involved in a romantic relationship. Participants completed three questionnaires: Experience in Close Relationships (ECR), Sternberg's Triangular Love Scale (STLS) and Sociosexual Orientation Inventory (SOI). The results showed that women had higher scores on the dimension attachment-related anxiety when compared with men. The dimension attachment-related avoidance was negatively correlated with STLS. However, women involved in a relationship when compared with those who were single had higher scores in STLS: intimacy, passion, decision/commitment and STLS total. Men involved in a relationship also differed in their scores of STLS, except in the intimacy subscale, when compared with single men. As expected, men differ from women in their SOI scores, being much more unrestricted. Furthermore, single men with restricted sociosexuality showed higher values for the avoidance dimension of attachment than women in the same condition. The highest scores on attachment anxiety scores observed for women could be interpreted as a mechanism used to hold the partner as a way to ensure emotional and material investment. Individuals with high scores on the avoidance dimension of attachment have difficulty in getting involved emotionally, confirmed by the values of STLS. Even single men with restricted sociosexuality had high scores on the avoidance dimension, demonstrating no emotional involvement, suggesting that short-term strategies may be more advantageous. However, being in a relationship can modulate the perception of love as seen in women and men involved in a relationship. The experience of love seems to be able to shape the STLS decision/commitment component even for men who, in evolutionary perspective, avoid commitment.

#### **4.12. Laura Stobäus, M.L. Seidl-de-Moura, D. Ramos & T. Victor**

Discounting the future: differences among youngsters from different socio-demographic contexts in Rio de Janeiro, Brazil.

Discounting the future (DF) is predicted to vary with extrinsic mortality rates. Rio de Janeiro presents the lowest life expectancy among the states of Brazil, and the deaths by violence reach the young people, predominantly, subjects between 16 to 25 years old. However, youngsters from the same context may experience it and be exposed to violence differently. In Rio de Janeiro, it happens because of the expressive inequality of the city. Thus we aim to study the differences of DF and the perception of context in a group of 160 youngsters, aged 16 to 30, of both sexes: 80 residents of two slums in Rio de Janeiro (Rocinha and Vigário Geral) and 80 undergraduate university students not residents of these slums or places with similar HDI. The instruments were the Perception of context Inventory; the DF scale of monetary choices and a Sociodemographic Inventory. A significant effect of group on DF scores ( $F 1,158 = 24.41$ ;  $p < .05$ ) was observed. Youngsters from the two slums had higher scores than the university students. No significant results were found for sex as a factor, either with the whole sample or with the group of slum residents, but an effect of sex X group interaction for the whole sample ( $F 1,156 = 4.20$ ;  $p < .05$ ) was observed. Thus, sex is affecting DF in interaction with context. Males discount more than females and this occurs in both slums, but female university students discounted more than the boys, an unexpected result. The highest mean in DF is from VG's boys, the lowest is in the boys from the university group. An expected effect of group on perception of context was found ( $F 1,156 = 60.83$ ;  $p < .05$ ). Youngsters from the two slums have worse perception of the context where they live than the university students. No general effect of sex was observed, but the interaction sex x group ( $F 2,152 = 3.65$ ;  $p < .05$ ). The lowest scores are from the girls of VG and the highest from the girls from the university students' groups. It seems that the girls are more sensitive to their contexts than the boys. The results confirm the theory of DF and the expected effect of context variables on the strategy employed to design and plan their future in longer or shorter periods of time. They also indicate that the perception youngsters have of the context they live may be a relevant variable in DF.

#### **4.13. Odette van Brummen-Girigori**

Does father absence place daughters at risk for early sexual activities, lower academic performance and a less stable intimate relationship as adults?

Does father absence place daughters at risk for early sexual activities, lower academic performance and a less stable intimate relationship as adults? On Curacao, an island in the Dutch Caribbean approximately 40% of the children grows up without a father in female-headed households. Many parents on Curacao assume that growing up without a father has no negative effects on the development of their children. However, several studies from an evolutionary perspective have shown, that exposure to father absence was strongly associated with elevated risk for early sexual activities, precocious sexuality, academic problems and unstable relationships as adults. In the present research conducted on Curacao we investigated if father absence places their daughter at special risk for early sexual activities, more sexual partners, lower academic performance and lower expectations about a stable intimate relationship in the future. We collected data from 300 girls of an average age of 19 years ( $SD = 3, 76$ ). Following Ellis, Bates, Dodge, Fergusson, Horwood, Pettit & Woodward (2003) we divided the group in three categories, namely: 'early onset of father absence', 'late onset of father absence' and girls that grow up with a father were labeled as 'father presence'. The participants were questioned concerning their sexual behavior (e.g. age of their first sexual activity, the amount of their sexual partners and their sex- drive), their expectations about a stable intimate relationship (e.g. getting married, having a happy marriage, getting children and grandchildren) and finally about their academic performance. In line with previous research we found that early father- absent girls initiated their sexual activities at a significant earlier age than father- present girls. We also found significant differences between our three categories concerning academic performance and their expectations about a stable relationship. In addition the results also indicated that father- present girls found it significantly more important to get married and have a happy marriage compared to early father- absent girls and late father- absent girls. It was also shown that early father- absent girls found it significantly less important to have grandchildren compared to the categories of late father- absent girls and father- present girls. Furthermore it was shown that father- present girls had significant higher educational performances than late- absent father girls. Implications of these findings will be discussed in the context of literature on growing up without a father from an evolutionary perspective.

#### **Group 5. Economics.**

##### **5.1. Stephanie M. Cantu, K. Durante, V. Griskevicius & J.A. Simpson**

Briefcase over baby: the influence of sex ratio on career aspirations.

An important factor in the mating and parenting behavior of animals is the ratio of males to females in a given population. Drawing on theory in evolutionary biology, we examine how sex ratio affects human behaviors, such as by influencing career choices. Using both historical data and experiments, we demonstrate that sex ratio influences women's and men's career aspirations. In Study 1, we gather information from the U.S. Census and the Department of Labor to correlate the percentage of women in the 10 highest-paying professions (e.g., lawyer, pharmacist) with the ratio of men to women in the 50 largest metropolitan cities. A significant negative relationship indicates that as the ratio of men to women decreases, more women can be found in the highest-paying careers. After demonstrating this phenomenon in the real world, we experimentally test how skewed sex ratios influence men's and women's career choices. In Study 2, we prime women to believe there is a scarcity or an abundance of potential male mates by showing them various photo arrays. Following the prime, women answer questions about their preference for having a career or having a family. We replicate our findings in Study 3 for both men and women using a different type of prime (reading a story). We also test how a person's own mate value moderates the type of career he or she chooses to pursue in a skewed sex ratio environment. Across these studies, we found that for women, a scarcity of marriageable men led them to prioritize high-paying careers and to delay starting a family. This finding suggests that the availability of male mates impacts how women prioritize their careers and families. For men, a scarcity of women also led them to pursue careers rather than starting a family. Although a scarcity of the opposite sex led both men and women to invest in careers, Study 3 shows that people pursue specific types of careers as a function of their own mate value. These findings are the first to demonstrate and experimentally test the notion that sex ratio influences psychology in ways consistent with evolutionary biological theory.

## **5.2. Andrew Clark & Isabel Scott**

Economic ideologies - lessons from Darwin.

Although not perfect analogies of each other, the parallels between living systems and economic ones are easy to see; both are examples of dynamic systems involving complex interactions between a multitude of agents. Moreover, both of these systems are heavily influenced by self-organising processes that emerge within them - natural selection within living systems and the "invisible hand" within economic ones. Understanding these processes are essential to understanding the systems they operate in, but it is easy to misunderstand them as well. Adherents of social Darwinism fell prey to committing naturalistic fallacy in the early days of Darwinian thought; it has been proposed that modern adherents of laissez-faire economics, or market fundamentalism, may be victims of the same sort of error. We believe that this is plausible and that additional insight can be obtained from referencing research within evolutionary biology. Interaction between economic agents mirror interactions between conspecifics within a species, or organisms within an ecosystem, in that they are characterised by a kind of imperfect mutualism; both parties ultimately require the interaction but may have different optimal outcomes and unequal powers to affect it. In evolutionary biology, this type of interaction is well-studied in the form of sexual conflict arising from sexual selection. These studies tell us that this self-organising process often results in outcomes that are morally and/or socially undesirable. On top of that, the outcomes are characterised by inefficiency and render populations more vulnerable to collapse and extinction. Economists could draw on these findings to illustrate how an economy left completely to the manipulations of the "invisible hand" may suffer similar outcomes.

## **5.3. Michael Frederick & S. Cocuzzo**

Why work when you could freeloading? Contrafreeloading in quinpirole-treated rats is not due to force-of-habit.

Contrafreeloading, sometimes referred to as the 'Protestant Ethic Effect', occurs when an animal performs unnecessary work to obtain a reward that is freely available. For example, previously trained rats will press a bar to obtain pellets of food even when a dish of the same food is present. Although contrafreeloading violates what behaviorists refer to as the Law of Least Effort, it has been observed in species ranging from fish to humans. Its generality suggests the behavior may have adaptive benefits. One evolutionary explanation offered by Inglis et al. (1997) suggests that by continuing to sample a variety of food sources, organisms gather useful information about their environment. Thus, contrafreeloading may be a form of exploratory behavior. Recently, it has been shown that quinpirole, a selective D2/D3 dopamine receptor agonist, significantly increases rates of contrafreeloading for water in rats. Milella et al. (2008) have suggested that this increase occurs because the drug confers behavioral rigidity (i.e. the rats fail to adjust to the presence of free water and continue to bar-press out of habit). Alternatively, the drug may exert its effects by promoting exploratory activity and behavioral flexibility. In the current study, rats were initially trained to bar-press for water in operant chambers containing two levers. During the experiment, they were treated each day with either quinpirole or vehicle and tested in 30 minute operant sessions. During the second phase, free water was made available in the form of a water bottle placed in the chamber. As expected, the drug-treated animals responded at higher rates than controls when free water was available. Thus, quinpirole led to increased contrafreeloading. Importantly, during the second phase, the drug-treated animals showed a marked tendency to respond on both operant levers, rather than strongly preferring one lever as they had done before the free water was made available. Thus, they displayed behavioral flexibility, rather than rigidity. These results suggest that quinpirole increases contrafreeloading by promoting exploratory behaviors. This approach may provide a novel method for uncovering the neural basis of curiosity.

## **5.4. A. Ellis White, Y.J. Li & D.T. Kenrick**

Dream jobs: How fundamental goals influence our employment preferences.

While the modern workplace may seem far removed the environment in which our ancestors "worked," jobs today can vary in several fitness-relevant characteristics- starting salary, the potential for promotions and raises, job security, social environment, etc. How do modern humans navigate trade-offs between these characteristics? An evolutionary perspective suggests that the relative importance of each characteristic may vary as a function of an individual's current goals as well as their life history strategy. The present research adopts a budget allocation method to investigate the characteristics that people value in a potential job. In 2 experiments, we examine how activating fundamental goals, such as mating, self-protection, and disease avoidance, influences

the relative importance of six job characteristics. Moreover, we explore how individual differences, such as socioeconomic status, interact with activated goals to affect preferences for these characteristics.

## **Group 6. Emotions.**

### **6.1. Heitor Fernandes, J. Natividade & C. Hutz**

**Sex differences in jealousy: testing the evolutionary hypotheses with a Brazilian validated scale.**

Jealousy is defined as a mechanism that deals with real or imagined threats of loss of a romantic partner. Different methods of study, in various cultures, showed that women are more distressed because of emotional infidelity than sexual infidelity and men vice versa. This study aimed to test the evolutionary hypothesis regarding jealousy using the Brazilian validated Scale of Sexual and Emotional Jealousy (SSEJ), testing differences in levels of emotional and sexual jealousy within each sex, and between the sexes. Participants were 435 people, mean age of 27.8 years, 60% were women, 58.7% were graduated, and 79.8% were in a committed relationship. Of these, 93.6% were in a heterosexual relationship. Participants answered an online survey, which contained sociodemographic questions and the SSEJ. Participants also answered four forced-choice questions about the two kinds of infidelity (emotional and sexual): in the first, they should inform which would be harder to forgive; in the second, while the task was the same, the two kinds of infidelity were rendered mutually exclusive; in the third, both kinds of infidelity were happening together; and in the last question, they were asked to inform which would distress them more. The SSEJ expressed 10 different cues to emotional or sexual infidelity, and it had 5 points (1= "not distressing at all", 5 = "extremely distressing"). For women the mean of emotional jealousy was 3.87, and of sexual jealousy 3.38. This difference was statistically significant. For men the mean of emotional jealousy was 3.25 and of sexual jealousy 3.29. This difference was not significant. Women's emotional jealousy was also significantly higher than men's. Of those who marked sexual infidelity as more distressing or as harder to forgive in all four forced-choice questions concomitantly, 67.8% were men. Of those who marked all four questions saying that emotional infidelity was worse, 78.9% were women. These results indicate a significant association between participants' sex and infidelity-type. The present results corroborate the findings of other studies that investigated sex differences in jealousy in other cultures with various methods, showing that there are sex differences for emotional jealousy and that for women this kind of jealousy is more distressing than sexual jealousy.

### **6.2. Katherine Hanson Sobraske, J. Boster & S. Gaulin**

**Surveying the jealousy landscape.**

Evolutionary approaches to the study of romantic jealousy have been dominated by the idea that there are of two distinct types of threats to pair-bonded relationships – sexual and emotional – and that, over human evolution, these two threat types have impacted men and women's fitness differently. This theory-driven perspective has spawned some controversy but also garnered considerable empirical support. However, it began by assuming a taxonomy of jealousy that has never been tested. What is the full cognitive space subsumed by romantic jealousy, and is its architecture best described in terms of orthogonal sexual and emotional axes, as current theory assumes? We used a methodology explicitly designed for mapping cognitive space to study the scope and dimensions of romantic jealousy in a large sample of University-aged men and women and in a somewhat older group of participants from the wider community. Considered separately or together, responses from all participant groups defined a jealousy space with the same two primary dimensions, neither of which was sexual or emotional. Instead, regardless of participant age, sex, or infidelity experience, severity of threat was the primary dimension and specificity of the threat was the secondary dimension of the romantic jealousy space. More fine-grained analysis suggested that, for approximately 20 percent of threats defined by their high severity, a sexual-emotional continuum (rather than orthogonal axes) best described their secondary dimension. Because all participant groups defined a romantic jealousy space with significantly similar architecture, sex differences may not be as great as has been suggested by prior jealousy research.

### **6.3. Viktorija Mileva & A. Little**

**Human facial expressions are modulated by manipulated facial dominance.**

Human facial expressions convey emotion and intentions to others without the need for words. Modulating the intensity of an expression allows for a more detailed, incremental mode of non-verbal communication. While expression changes quickly, structural aspects of facial appearance are relatively stable across time, and how expressions are perceived may interact with these other aspects of facial appearance. We investigated the

relationship between the perceived intensity of expressions and perceived dominance in human faces. We measured intensity judgements of expressions, and whether these differed between faces manipulated for perceived dominance. Female and male faces exhibiting angry, fearful, and sad expressions were manipulated to look more and less dominant and were shown to participants, who were asked to judge how angry, sad, and fearful each face appeared on a 7-point likert scale. All three types of expressions in faces exhibited significant variation in intensity between dominant and less dominant manipulations (excluding fear in female faces). Generally, high dominance made all faces appear more angry and less sad or fearful. Angry male faces demonstrated the strongest effects, with high dominant faces scoring much higher in anger intensity than less dominant faces. Similar, but weaker, results were obtained for angry female faces. These results suggest structural aspects of appearance interact with expression, changing how certain emotions are interpreted. Individuals who look dominant then tend to be seen as having more intense expressions of anger but less intense expressions of fear and sadness. This means others can more easily interpret anger expressions dominant-appearing individuals produce, and so others may be more influenced by these anger expressions. Conversely, others may not see more subtle expressions of sadness or fear produced by dominant-appearing individuals. This may have important consequences for how others interact with dominant and less dominant-appearing individuals.

#### **6.4. Audrey Milhau, T. Brouillet, L. Heurley, E. Rolland-Thiers & D. Brouillet**

When emotion creates action: emotion as an adaptive mechanism.

For embodied cognition, individuals interact with objects via automatic simulation of sensorimotor processes usually occurring when perceiving or acting on it (Barsalou, 2008, Glenberg & Kaschak, 2002, Brouillet et al, 2010a). Emotional studies showed that processing an emotional word (e.g. love, war) involve the simulation of motivational behavior: approach and avoidance. The congruence between the simulated and an executed movement facilitates processing, whereas incongruence disrupts it (Chen & Bargh, 1992; Cacioppo et al, 1993; Freina et al, 2009): it's easier to respond for positive words by pulling a lever (approach) than pushing it (avoid), and conversely for negative words. But other movements, non-motivational, are associated to emotions: it seems that lateral directions are emotionally-connoted (Casasanto, 2009), depending on manual laterality. The idea is that when a movement is easy (for right-hander, rightward), it's felt as positive, so it emotionally matches with an approach movement simulated when perceiving a positive word (conversely, for leftward movements, negative words and avoidance simulation). We designed an experiment to directly compare specific motivational-adaptive behavior (approach/avoidance direction) and non-specific behavior (left/right moves). We used a valence judgment task with congruent and incongruent conditions. Our hypothesis was to distinguish the effects of traditional approach/avoidance task, implying both motor and emotional compatibility, and conditions were the response gestures are not the same that simulated actions, then involving only an emotional matching between the valence of the word and the affect associated to a specific movement. Our results showed that motor and emotional compatibility, when separated, have different consequences. In the case of specific-motivational movements, congruence between simulated and executed movements allowed faster RTs than incongruence. Associate motivational-adaptive behavior to the wrong valence represents an endangering situation for the individual, and so might have interfered with the task. For non-specific behaviors, emotional-compatibility led to faster answers for congruent associations of positive words and approach movement compared to other groups, with no difference between the congruent situation involving negative words and the two incongruent conditions. It resonates with the principle of fluency, explaining that an easy action implies a positive feeling, but other movements are not conversely linked to negative affect (Reber et al, 1998; Winkielman & Cacioppo, 2001). In conclusion, emotional congruence facilitates cognitive activities, acting as a positive reinforcement for the successful execution of a task. Addition of motivational movements in the equation leads to different effects, depending on the adaptive or dangerous nature of word/movement associations.

#### **6.5. Jean Carlos Natividade, Heitor Fernandes & C. Hutz**

Why are women more jealous, and why do men like it? Sex differences in jealousy with a Brazilian sample.

Jealousy is a psychological mechanism that deals with a real or imaginary threat to stability of a romantic relationship. Considering that energy allocation to ultimate goals in a romantic relationship (bearing and rearing

a child) is higher in women, they could be expected to demonstrate greater distress in relation to threats to the stability of their relationships. In addition, in the love market, if one sex demonstrated more jealousy, that would raise their mate's value and, consequently, jealousy demonstrations would be appreciated by his/her mate's sex. Based on these notions, we elaborated this research with the objective of testing the hypothesis that women would present higher levels of jealousy than men, but that men would value jealousy more than women. Participants were 435 people, mean age of 27.8 years, 60% of whom were women, 58.7% were graduated, and 79.8% were in a committed relationship, of which 93.6% were in a heterosexual relationship. Of all participants, 23.4% declared having started an argument with their partner because of jealousy in the last month. The participants answered an online survey containing sociodemographic and questions about relationships, and the Scale of Sexual and Emotional Jealousy (measuring the level of distress elicited by sexual or emotional infidelity cues), the Scale of Self-Evaluation of Jealousy (measuring how jealous the respondent feels in general), the Jealousy Attitudes Scale (measuring how positive or negative jealousy is in the person's life and relationships), the Scale of Jealousy Reactions (measuring the level of investigative and controlling behaviors a person has towards a romantic partner) and the Brazilian version of the Rosenberg Self-Esteem Scale. Women presented a higher mean than men in the self-evaluation of jealousy, in jealousy reactions, and in the emotional dimension of jealousy, while men presented higher levels than women in positive attitudes toward jealousy. There were no sex differences for the sexual dimension of jealousy, or for self-esteem. Furthermore, women, more frequently than men, declared having started an argument because of jealousy. The results showed that women are more distressed by jealousy and express it more. Meanwhile, men, more than women, consider jealousy to be positive. These results confirmed our prediction and make us think about the evolutionary psychology's capacity to generate testable hypotheses, especially those that, in principle, would be in disagreement with traditional areas like Social Psychology and models such as Cognitive Dissonance. Finally, we stress the importance of conducting new studies in others contexts.

## **6.6. Renata Pereira deFelipe, L. Cosentino & V. Bussab**

Paternal support role in the emergence of postpartum depression in a brazilian sample.

Postpartum depression (PPD) can be considered an adaptation able to help the mother evaluate when the costs outweigh the benefits, leading her to reduce maternal investment. This investment reduction could help the mother negotiate greater levels of investment from others, motivating individuals of her social net to increase their investment on childrearing. Problems with pregnancy, delivery, infant viability, lack of social support, and impoverished environments are closely associated with PPD. Our objective was to evaluate influence of maternal perception of social support on PPD levels. The measurement of perceived social support was provided by a questionnaire including the Brazilian version of Social Support Scale (SSS). This study is part of a longitudinal research concerning PPD effects on infant development of a low-income Brazilian sample. Our sample was composed by 211 participants. Semi-structured interviews and Brazilian version of Edinburgh Postnatal Depression Scale (EPDS) were applied at third trimester of pregnancy and at 3 months postpartum. The PPD prevalence was 28%. The results showed that: (1) perceived social support was significantly lower in depressed mothers than in non-depressed ones ( $t$  test:  $t_{65} = 2.710, p=0.01$ ); (2) there was a significant negative correlation between PPD level and perceived social support (Pearson correlation:  $r = -0.464, p<0.01$ ); (3) when father was considered the most supportive person on childrearing, perceived social support ( $t$  test:  $t_{40} = 2.409, p=0.02$ ) was higher and PPD levels ( $t$  test:  $t_{132} = 2.339, p=0.02$ ) were lower, than in the father's absence in the mother's extended social net; and (4) depressed mothers were significantly less supported by the father's child than non-depressed who were more supported by their extended social net (other relatives and non-relatives) ( $\chi^2(1)=4.865, p=0.03$ ). The adaptive hypothesis for PPD considers the lack of both paternal and general social support crucial for the presence of PPD. Our results corroborate this hypothesis, indicating that the lack of paternal support on childrearing can be more significant to the emergence of PPD, because mothers apparently feel less supported and unsafe without their partners nearby. So they probably present a low mood state that claims specially for father's help. Finally, the consideration of distal aspects must be a useful tool for a more comprehensive understanding of psychopathologies in general.

## **6.7. Pia Reindl, K. Grammer & E. Oberzaucher.**

Simulating appraisal processes of emotional events.

Facial expressions and body postures reflect our emotions as signals for our communication partners. In this study we addressed on the question how we experience and appraise emotions. Movie animations of virtual agents were used to reconstruct facial and bodily expressions of specific emotional events. Values for the Stimulus Evaluation Checks determined by the Geneva Appraisal Questionnaire (GAQ) developed by Scherer (2001) were regressed on a pleasure-arousal-dominance (PAD) *circumplex-model* (Russell, 1980). Empirical data from previous research concerning AU activations (Grammer & Oberzaucher, 2006) and body angles (Grammer et al., 2004) were also mapped on the PAD-space. The computed regression equations were translated into behavior output of avatars (Poser 8, Smith Micro Software) corresponding to the given emotional event. Out of 332 GAQs those events with the five highest, respectively lowest scores for pleasure, arousal and dominance in both sexes were chosen for reconstruction. Two validation studies were conducted: one with animations showing only the avatars' faces and one showing their whole bodies. Participants (N=165) were asked to evaluate 60 animations each in a forced choice task. Results proved the valid accuracy of this approach: Correct events were attributed to the movies above chance. This study shows that it is possible to recreate facial expressions and body postures with virtual agents based on stimuli that happened in real life. All included behavioral aspects seem to be important for the appraisal process of emotions.

## **Group 7. Human biology.**

### **7.1. Louis C. Alvarado, A. Galbarczyk, M. Walas & G. Jasieńska**

Testosterone, musculature, and strength across the life course of men from rural Poland.

Across vertebrates, the steroid hormone testosterone supports male mating effort, which in human males, comes at the expense of parenting effort. At the behavioral level, testosterone promotes libido and facilitates aggression in reproductive contexts. At the physiological level, testosterone supports both spermatogenesis and the sexually dimorphic musculature that figures into male-male competition and female choice. It has been hypothesized that an intricate relationship exists between testosterone and musculature such that favorable ecological conditions promote elevated testosterone, musculature and competitiveness, while periods of energetic stress result in a diminished, thriftier phenotype. However, men use their musculature not only to attract and compete for mates, but also to support their subsistence activities and productivity, important components of men's parenting effort. This suggests that, in populations where men's productivity requires intensive physical labor, a fixed relationship between testosterone and body composition would not be adaptive. We examined the association between testosterone, musculature, and strength in a rural farm village (at the Mogielica Human Ecology Study Site) in which men's subsistence activities are often associated with demanding manual labor. We predicted that men's testosterone levels would decline with age, but that musculature and strength would be maintained to a greater extent across the life course. Data were collected from 29 Polish men, ages 20-80 with a median age of 43 years. Grip and chest strength were assessed using a dynamometer, and musculature was estimated using arm circumference, adjusted for body fat. Testosterone levels were obtained from morning saliva samples. Testosterone levels, arm circumference (adjusted for body fat), grip and chest strength were all negatively and significantly associated with age. However, men's testosterone levels showed a pronounced decline following young adulthood, while musculature and strength were maintained throughout young and middle adulthood and did not decline significantly until old age. These findings are consistent with our prediction that physical demands of men's subsistence activities can influence divergence between men's testosterone levels and their musculature and strength. Alvarado was supported by the Graduate Research Fellowship Program from the National Science Foundation, 2008-2011.

### **7.2. Delphine de Smet & L. van Speybroeck**

Reinvestigating the Westermarck effect on brother-sister incest aversion: taking the physiological-experimental turn.

Current moral philosophical, evolutionary and experimental psychological studies of incest aversion typically depart from the Westermarck effect, stating that co-residing children will likely experience a sexual aversion towards each other once they reach adolescence and that the duration of this co-residence is proportional to the degree of incest aversion felt. Living together hence is supposed to create a proximity which spontaneously

causes children and/or adults to avoid incestuous sexual behaviour. Westermarck (1891) interpreted this effect as an evolutionary adaptation, today forming an early example of evolutionary psychological thinking: by avoiding the dangers of inbreeding, incest avoidance due to cohabitation results from natural selection and now forms part of our human nature. Recently however, the evolutionary plausibility of the Westermarck effect has been criticised based on the assumption that inbreeding is only detrimental under specific populational and genetic conditions (Leavitt 2007). Also the empirical plausibility of the effect remains unsure: long time the only empirical sources were fieldwork trials mainly performed in Taiwan (Wolf 1995) and Israel (Sheper 1971). Although these trials' results confirm the existence of a Westermarck effect, diverse methodological criticisms have been raised next to the criticism that these investigations are only possible in the exceptional case when unrelated children grow up together like brothers and sisters. More recently, questionnaires in the USA found a positive relation between, on the one hand, co-residence duration with one or more siblings from the opposite sex and, on the other hand, forms of aversion towards incest (Lieberman et al. 2003, 2007; Fessler & Navarrete 2004). However, other research did either not confirm these results (Royzman 2008) or indicated in contrast that familiarity and proximity enhance sexual attraction between siblings (Fraley & Marks 2010). As questionnaires also do not exclude the danger of socially desirable answers, it becomes necessary to reinvestigate the Westermarck effect from a different angle if we want to gain insight into the basic mechanisms of incest aversion. In an experimental setting, we therefore measured diverse physiological parameters of subjects watching photographs showing neutral activities or suggesting incestuous activities. Our result indicate how subjects physiologically react to sibling incest and how these reactions relate to (i) co-residence duration, (ii) the types of visceral disgust currently recognized in the academic literature, and (iii) subjective rating of incest in questionnaires. Consequently, our results are of relevance to moral scientific, psychological, therapeutic and juridical studies related to incest and (moral) disgust.

### **7.3. Laurent P. Ferrier, L. Heurley, P. Clauzon, D. Brouillet & M. Jimenez**

Color perception is not immune to potential action and perceptual knowledge.

Two experiments show the linkage between potential action and knowledge in a color categorisation task. Black-and-white primes and colored targets were used in a priming paradigm in which response time (ms) and accuracy were measured. First experiment shows the influence of potential action evoked by a graspable object on color categorisation. The results we obtain in a choice reaction task (CRT), inspired by the paradigm of Tucker & Ellis (1998), show that color perception is not immune to the potentiality of the observer's action. This result tends to reconcile ecological and representational approaches of visual perception (see also Norman, 2002). The correspondence between the orientation of the handle of objects and the orientation of the responding hand produces facilitation and better response accuracy compared to incongruent and baseline conditions. This first result, challenging the classical dissociative approach of the visual system (Ungerleider & Mishkin, 1982 ; Milner & Goodale, 1995), relies on recent works that propose an alternative to this dissociation (Creem & Proffitt, 2001; Frey, 2007; Derbyshire et al. 2006) and that are essentially based on motor resonance and simulation processes as a condition to identification and recognition (Rizzolatti & Matelli, 2003). The second experiment shows facilitation when color perception is congruent with a prior color knowledge access. Here, participants see black-and-white lined drawings followed by a green or a yellow target. Primes were objects with typical color (e.g. yellow for a lemon or green for a frog) or without associated color (baseline condition e.g. ####). Experiment consists in a quick categorization of the target's color (CRT). Results we obtain show facilitation when the typical color of the prime is similar to the target's color, compared to incongruent and baseline conditions. As experiment 1 demonstrates an interaction between perception and action, these results show an interaction between memory and perception. This interaction goes against the modular cognition theory postulating that perception and memory are two independent modules. Moreover, this result reveals the importance of memory/perception interaction to anticipate environmental changes (Bar, 2007). Our experimental work completes the classical results on color perception. It highlights the role that color perception has in food selection, sexual behavior and other characteristics for adaptation and underlines the deep proactivity and the interactive nature of perception, cognition, memory and actions.

#### **7.4. Ilmari Määttänen, M. Jokela & L. Keltikangas-Järvinen**

Testosterone and temperament: moderating role of marital status.

Testosterone has been implicated as an important hormonal factor in human mating and sexual selection. Testosterone is involved in the allocation of mating vs. parenting effort, as demonstrated by the lower testosterone levels in married men and fathers compared to non-married men and non-fathers. However, the causal pathways connecting testosterone to mating success are less well known; besides its associations with men's body shape and muscle mass, testosterone has been shown to affect personality, especially traits related to extraversion and sensation seeking. In a large sample of Finnish men (n=918), we examined whether levels of free testosterone are related to men's temperament (assessed with Cloninger's Temperament and Character Inventory; TCI), and whether these associations are moderated by marital status. Testosterone and temperament were measured in two time points in 2001 and 2007. We found that Novelty seeking was higher in men with high testosterone levels (standardized  $\beta=0.10$ ,  $p<0.001$ ). In addition, this correlation was stronger in non-married men ( $\beta=0.17$ ,  $p<0.001$ ) than in married/cohabiting men (standardized  $\beta=0.06$ ,  $p=0.06$ ). The finding supports an association between testosterone and sensation seeking in men, and demonstrates that this association is attenuated in married/cohabiting men, as would be expected by their lower mating effort.

#### **7.5. Melanie A. Martin, S. J. Gaulin, R. Evans, W. Lassek, M. Gurven, H. Kaplan, A. L. Morrow, J. G. Woo**

Breast is best but whose is better? Maternal milk fatty acid composition in U.S. and Amerindian mothers.

Maternal intake of fatty acids during pregnancy and nursing has a direct effect on fatty acids available for fetal and infant growth and development. In particular, developing fetuses and infants need sufficient long-chain omega-6 and omega-3 polyunsaturated fatty acids (LCPUFAs) to support brain growth and visual maturation. However, fatty acid intake and availability in maternal milk varies widely. We compare the fatty acid content in milk samples taken from women in the U.S. and an Amerindian population, the Tsimane of lowland Bolivia. The traditional Tsimane diet rich in wild game, fish, and cultivated plants, appears to favorably influence milk fatty acid content. As compared to infants in developed countries, Tsimane infants likely have greater access to LCPUFAs through their mothers' higher LCPUFA status and prolonged and frequent nursing. We discuss the evolutionary implications of traditional diets and nursing behaviors on infant LCPUFA status, growth, and development.

#### **7.6. Dillon Niederhut**

A brief survey of human uniqueness.

In the study of what separates *Homo sapiens* from other animals, four separate but related themes have emerged: free will, rational behavior, social behavior, and language. The evolution of these ideas in Western thought from the Bronze Age myths of ancient Greece to modern philosophy in the time of Darwin will be presented. This will be followed by a discussion of how these pre-Darwin ideas are still present in the behavioral sciences, and how they compare to recent findings in neuroscience.

#### **7.7. Robert Oum & L. Hone**

The falling age of menarche in modern societies from an evolutionary life history perspective.

The age of menarche has fallen dramatically in the past century in industrialized societies worldwide, and a number of different physical and psychosocial factors have been implicated as possible causes. Here, we propose that these factors are not mutually exclusive and can in fact be unified under the metatheoretical framework of evolutionary Life History Theory (LHT). According to LHT, the transition from childhood (the pre-reproductive period) to adulthood (the post-reproductive period) reflects the commencement in a shift of allocation of resources to reproduction in addition to the competing demands of survival and growth. Reproductive maturation may thus be seen as a trade-off between growth and reproduction, and the timing of when this trade-off occurs is likely to be dependent on local availability of resources: resource-scarcity would lead to a slower life history, and resource-abundance would lead to a faster life history. We present evidence from World Economic Outlook (WEO) data provided by the International Monetary Fund that suggests local cues to resource availability present in early childhood, and possibly prenatally, may be used to regulate the timing of reproductive maturation in girls in a manner consistent with LHT: an inverse relationship is found between global indices of living standards and mean ages of menarche, longitudinal changes in mean ages of menarche within

countries are negatively associated with changes in nutritional availability, and differences between populations within countries are similarly associated with differences in living standards between these populations. LHT may be similarly used to make predictions for male pubertal maturation and psychosocial maturation in both sexes. Implications for public health and education will be discussed.

### **7.8. Takumi Tsutaya, A. Shimomi, H. Mukai, T. Nagaoka, J. Sawada, K. Hirata & M. Yoneda.**

A model for estimating weaning ages in archaeological populations using nitrogen isotopes and bone turnover rates.

Because the shorter lactation period is one of the unique features of human life history, it is meaningful to investigate when and how this feature has obtained over the course of human evolution. Stable isotope analysis has been used to reconstruct breastfeeding practices in archaeological human populations. Exclusively breastfed infants show elevated  $\delta^{15}\text{N}$  ratio ( $\delta^{15}\text{N}$  value) and the introduction of weaning foods gradually depress the  $\delta^{15}\text{N}$  value until the completion of the weaning process. Breastfeeding practices in archaeological populations have been directly reconstructed by analyzing the  $\delta^{15}\text{N}$  values of excavated infant and child bones across a series of age. However, these previous studies have only estimated weaning ages qualitatively since there is no suitable mathematical model for the interpretation of isotope data. This is why the weaning ages of archaeological population estimated from isotopes has not been comparable to those of modern populations estimated from direct observations. In this study, in order to estimate the precise ages for both the onset and completion of weaning, we apply a new model that simulates the change in the  $\delta^{15}\text{N}$  values of infant and child skeletons during the period of weaning to some archaeological populations. First, we estimated the turnover rates of infant and child bone collagen by age, based on data of anthropogenic strontium-90 in infant and child bones and dairy foods during the 1960s. Second, we incorporated these rates into the equations to simulate changes in  $\delta^{15}\text{N}$  values of infant and child bone during weaning. Then, we applied this model to measured data of previously reported five populations, and estimated the optimized plausible parameters (weaning ages and the  $\delta^{15}\text{N}$  value of breast-milk and weaning foods), respectively. Furthermore, we also evaluate the uncertainties with these parameters by using the Monte Carlo method. Our simulation model reasonably worked well and the calculated biological parameters are consistent with those estimated from the results of experiments in modern mothers and children. The results of this research also demonstrate that bone turnover rates rapidly decrease in the early stage of infancy. In this study, this model is applied to some archaeological populations from various periods and regions. We can discuss relationships between breastfeeding practices and cultural factors such as diet, subsistence activity and sedentarism form from the evolutionary point of view by direct comparison among estimations from archaeological populations, ethnographic observations and primatology data.

### **7.9. Linda van Speybroeck & D. de Smet**

Why men do not make good vampires. Testing the ability of humans to detect true blood.

This study is part of a larger project investigating how emotions and, eventually, moral judgments of modern humans are influenced by unconscious, irrational or symbolic elements. In this context, blood forms an excellent case study: as witnessed by the current revival of vampire tales, worldwide blood continues to evoke deep fascination and fears. Still, human behaviour and psychology research thus far has been limited to phobic and aggressive responses to blood (e.g. Krcmar & Farrar, 2009; Olatunji et al., 2007a; van Overveld et al., 2006; Thyer et al., 1985). Little is known about the biological basis of such responses, let alone about how humans perceive blood in the first place. To fill this gap, we set up an extensive study investigating whether human subjects ( $N = 89$ ) can distinguish real blood from red control fluids under varying visual conditions, choice options and types of blood. Different questionnaires on disgust and blood phobia and two clinical olfactory tests were included controlling for between-subjects differences in performance. In contrast with the intuition that humans have poor olfactory capacities compared to those of animals (cf. Hart & Sussman, 2005; Shepherd, 2004) and in contrast with folk psychological beliefs measured via questionnaires ( $N = 235$ ), it is shown that humans are excellent detectors of animal blood (in casu pig blood), whereas the ability of detecting human blood appears to be much less developed and depends on visual conditions. Surprisingly, differences in olfactory capacities and personal experience with blood have no effect on blood detection, while blood fear seems to lower and disgust sensitivity seems to ameliorate this performance. This fits a psychological perspective in which fear triggers flight mechanisms, while disgust triggers alertness mechanisms allowing adequate avoidance strategies (cf. Wiens et al., 2008). Next to the discussion of several psychological, evolutionary and biological explanations for these

results, implications for studies mapping the role of disgust, blood fear and 'redness' (cf. Hill & Barton, 2005) in human behaviour and for future research on the behavioural and psychological impact of 'blood' on humans are explored.

**7.10. Vasiliy Vasilyev, E. Sukhodolskaya, P. Kulidzhanov, V. Burkova, A. Mabulla, M. Butovskaya & A. Ryskov**

Genomic variation of Dopamine transporter (DAT1) and Dopamine D2 receptor (DRD2) genes in two traditional East African groups: the Hadza and the Datoga.

The study of genetic basis of aggressive behavior is one of the leading directions of modern behavior genetics. Here we have studied the variability of two candidate genes (DAT1 and DRD2), presumptively associated with aggressive behavior, in two traditional African groups different by the level of culturally permitted in-group aggression – the Hadza (n=113), egalitarian hunter-gatherers and the Datoga (n=113), pastoralists and warriors. The functionally important polymorphisms were detected in 3' UTR regions of the DAT1 and DRD2 genes. In the DAT1 gene, the variable number tandem repeats (VNTR), ranging between 3 to 13 repeats, and in the DRD2 gene, the single nucleotide polymorphism (SNP) were detected. It was demonstrated that these two groups differed significantly by the frequency of distribution of homozygous genotypes DAT1\*9/9 and DAT1\*10/10 (in Hadza - 0,134 and 0,152; in Datoga - 0,078 and 0,421, accordingly). No differences between these groups were found for distribution on DRD2 loci Taq 1 A1 and Taq 1 A2. But the Datoga and the Hadza differed in distribution of allelic variants of associations DAT1 x DRD2. While the combinations of DAT1\*9/10 x DRD2 A1/A2 and DAT1\*9/10 x DRD2 A2/A2 (0,318 и 0,218, accordingly) were the most common in Hadza, the combination of DAT1\*10/10 x DRD2 A1/A2 and DAT1\*9/10 x DRD2 A1/A2 (0,292 и 0,195, accordingly) prevailed in Datoga. We suggest that the differences in distribution of DAT1 and DRD2 genotypes in Hadza and Datoga are due to different adaptations for in-group and out-group social competition. This study was supported by RFHR, grants №№ 08-01-00015a and 1101-00287a, the Federal innovation program, № 16.740.11.0172 and the grant for Fundamental Sciences to Medicine.

**7.11. Szymon Wichary & A. Ziolkiewicz**

Birth weight, recent life stress and anxiety.

Fetal programming is thought to be an important determinant of adult stress reactivity. Birth weight, which indicates the quality of fetal development conditions, is a good predictor of adult susceptibility to diseases, and is linked to stress reactivity as well. However, it is not yet clear what the exact nature of the latter relationship is. In the present study, we asked if birth weight moderates the relation between recent life stressors and state anxiety, measured daily in women over an entire menstrual cycle. We studied 132 urban Polish women of reproductive age, from whom demographic and anthropometric data were collected using standard measures and questionnaires. Psychological data were collected with Holmes and Rahe Recent Life Changes Questionnaire and with Spielberger State Trait Anxiety Inventory. We found a moderate negative association between recent life stress and anxiety levels for low birth weight participants, and no such association for high birth weight participants. We discuss these findings in relation to coping styles and to the mixed findings on birth weight and stress reactivity reported in other studies.

**7.12. Magdalena Walas, A. Galbarczyk, I. Nenko & G. Jasienska**

Digit ratio (2D:4D) as an indicator of biological condition among men from a Polish rural population.

Digit ratio (2D:4D) is a proportion between the length of the 2nd and 4th hand digits. It is determined during early foetal development, around 13th week of gestation, and depends on foetuses' exposition to concentration of sex hormones in the womb. Higher concentration of prenatal testosterone (in relation to oestrogen) is indicated by longer ring finger than index finger, and it is defined as low 2D:4D. High 2D:4D indicates a higher prenatal concentration of oestrogen (in relation to testosterone). Recent studies suggested, that prenatal prevalence of one of these sex hormones may have a significant role in programming male's future biological condition (including body size) and, in consequence, reproductive success. This study investigated the relationship between 2D:4D and size at birth (birth weight and length), body size (weight and height) during adolescence and number of children in adulthood. The study participants were 514 men from Mogielica Human Ecology Study Site located in Polish rural area with a high birth rate. Data were collected between 2003 – 2009 by personal questionnaires, and information about weight and length at birth was obtained from personal health

records or collected by an interview. Body dimensions and finger digits were assessed by anthropometric measurements. Men with lower 2D:4D in right hand were longer at birth ( $p=0,04$ ,  $n=294$ ), had a higher body weight during adolescence ( $p=0,02$ ,  $n=294$ ), in relation to a norm for particular age group of Polish children, and had higher number of children, when controlled for age ( $p=0,04$ ,  $n=220$ ). No statistically significant relationships were found for other variables. These results confirm a hypothesis which suggests that a higher prenatal testosterone concentration (low 2D:4D) may be related to larger body size in males during prenatal period (positive role of testosterone in determining body dimensions), and adolescence (better ability to store metabolic energy). Higher prenatal testosterone concentration and better biological condition afterwards, may increase male attractiveness and influence their reproductive strategies. This may lead to a higher number of children in adulthood. Summarizing, 2D:4D should be further tested as an prenatal indicator of subsequent male condition and reproductive success.

### **7.13. Lisa Welling, D. Puts, S.C. Roberts, A. Little & R. Burriss.**

Hormonal contraceptive use and mate retention behavior in women and their male partners.

Sex hormone levels appear to be associated with a variety of adaptive preferences and behaviors, particularly in women. Recent research has found that hormonal contraceptive use nullifies many of these adaptive effects in women and that it may even change other aspects of behavior that may directly influence mate choice, such as sexual jealousy. Here, we find that women using hormonal contraceptives report more frequent use of mate retention tactics, specifically behaviors directed toward their partners. Men partnered with women using hormonal contraceptives also report more frequent mate retention behavior, and this generalizes to both acts directed towards their partner and acts directed towards rivals. Additionally, among women using hormonal contraceptives, the dose of synthetic estradiol, but not of synthetic progesterone, positively predicts mate retention behavior frequency. These findings demonstrate how hormonal contraceptive use and, potentially, estrogen level may influence behavior that directly affects the quality of romantic relationships as perceived by both female and male partners.

### **7.14. Sonja Windhager, B. Fink, P. Mitteroecker & K. Schaefer**

Strong and handsome: Partial Least Squares analysis and deformation grids depict male facial characteristics that correspond to physical strength.

Evolutionary psychologists, anthropologists, and researchers of many other disciplines have long been interested in the causes and consequences of human facial shape. Yet, it has been difficult, if not impossible, to trace ratings or anthropological measures back to specific facial characteristics. Here we show how the geometric morphometric toolkit, and especially partial least squares (PLS) analysis, can be used to compare shape with several other traits. PLS gives a low-dimensional representation of the covariation of facial shape with any block of perceptual, physical, or behavioral variables. In our sample of 26 Caucasian men, the first PLS dimension accounted for 75% of the shape-trait covariation. Handgrip strength, shoulder width, body fat, as well as perceived dominance and masculinity contributed positively to this dimension, while body height and attractiveness had negative loadings. Faces corresponding to high scores on this axis have a relatively round shape and a broad, massive lower jaw, wider and thinner eyebrows, as well as thinner lips. Shape regressions with single predictors showed that, although morphological correlates of strength were more closely related to dominance and masculinity than attractiveness, faces of strong men showed a characteristic widening between the eyebrows and a pronounced masseter region that was not there in highly dominant or masculine rated faces. Our study adds to the growing body of literature that perceived masculinity and dominance might be similar constructs, whereas the correlation with attractiveness is sizeable but not identical. Geometric morphometrics might therefore serve as a valuable tool for refined hypotheses testing in inter- and intrasexual selection.

## **Group 8. Kinship.**

### **8.1. David Bishop, R. Albert, A. Gonzalez, K. Nichols & R. Ziegweid**

The role of grandparent ratings of phenotypic resemblance in discriminative grandparental investment.

Phenotypic similarity between grandparent and child and grandchild should be an important cue of genetic relatedness (Euler and Michalski, 2007). Since grandparents vary in the number of potential paternity uncertainty

links, a grandparent with greater uncertainty (paternal grandfather) should rely more on resemblance cues to calibrate investment differentials than a grandparent with greater certainty (maternal grandmother). In this study, 112 undergraduates were asked to report on the frequency of contact, gift exchanging, and emotional closeness to each of their four living biological grandparents. Subsequently, each grandparent was contacted by mail and asked to rate the degree of resemblance between themselves and the child's parent, between the child's parent and the grandchild, and between themselves and the grandchild—on five dimensions of resemblance (facial, body, personality, values, interests). Eighty-seven sets of grandparents responded. A series of repeated-measures ANOVAs on the grandchild ratings revealed that telephone contact, gifting giving and emotional closeness varied significantly between grandparent types. In each case, maternal grandmothers were rated highest and paternal grandfathers were rated lowest (maternal grandfathers and paternal grandmothers were intermediate). A 4 (type of grandparent) x 3 (relationship) x 5 (resemblance) three-way mixed ANOVA on the grandparent ratings of resemblance revealed significant main effects and interactions. The main effect for resemblance type was significant. Facial resemblance and body resemblance did not significantly differ; interest resemblance and values resemblance were significantly higher than facial, body and personality resemblance. The main effect for grandparent type was significant. Although paternal grandfathers produced significantly higher resemblance ratings than paternal grandmothers, maternal grandmothers were not significantly different than paternal grandfathers. The main effect for relationship was significant. Resemblance ratings between grandparent and child were significantly higher than ratings between grandparent and grandchildren. In addition, resemblance ratings between child and grandchild were higher than between grandparent and grandchild. The three-way interaction was significant. As predicted, several significant linear trends revealed that paternal grandfathers and maternal grandfathers produced higher resemblance ratings than paternal grandmothers and maternal grandmothers. Contrary to predictions, several significant quadratic trends also revealed that maternal grandmothers reversed this trend with higher resemblance ratings. Finally, the resemblance ratings of each grandparent type were used to predict investment and closeness. For example, only the resemblance ratings of the paternal grandfather reliably predicted rated closeness.

## **8.2. Yasuyuki Fukukawa, K. Kawaguchi & K. Takao**

The husband's mother is NOT always the devil in house: Testing the grandmother hypothesis in modern Japanese society.

**PURPOSE:** Human menopause leaves an extended postreproductive period for a large proportion of women (Thompson et al., 2007). As Sherman (1998) argued, however, menopause is an evolutionary puzzle - because natural selection favors increased reproduction, how could terminating it early be beneficial? The grandmother hypothesis proposes the benefit of early menopause by insisting that reproductive cessation is an adaptive consequence of senescence to enable grandmothers to help their adult children rearing their grandchildren. The purpose of this study was to test the hypothesis through analyzing a survey data of Japanese middle-aged and older women. **METHODS:** The original source of the data was the National Family Research of Japan: Special Survey 2001 (The National Family Research committee of the Japan Society of Family Sociology, 2001). This data was provided by the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, the University of Tokyo. The study sample was composed of 3,168 Japanese women (mean age  $54.0 \pm 12.4$  years old), who have at least one child. By using structural equation modeling, we investigated whether the household grandparental presence effects on the probability of a grandchild's birth via increasing reproductive success of their children. **RESULTS:** After controlling for some confounding variables, we found that the only grandparent whose presence exerted a positive ( $p < .001$ ) effect on the likelihood of a second child's birth (or shortening of the first and the second child birth interval) was the husband's mother. This effect also led to the likelihood of a grandchild's birth (or an early birth of a grandchild), in a statistically significant level ( $p < .001$ ). **CONCLUSION:** The findings of this study suggest that postreproductive women (in contrast to men) contribute to the increase of inclusive fitness by their maternal invest on their adult children. The most beneficial parent, however, was not the biological mother, but the mother-in-law. In Japan, it isn't unusual for a daughter-in-law to live with her mother-in-law at the same time she gets married. The implication, therefore, is that it is necessary to take any cultural context into consideration when testing the grandmother hypothesis in a modern society.

### **8.3. Andrzej Galbarczyk, M. Walas, I. Nenko & G. Jasienska**

Duration of breastfeeding is differentially influenced by paternal or maternal grandparents in a contemporary rural Polish population.

Several studies have shown that grandparents have a significant impact on the initiation and duration of their grandchildren's breastfeeding. Evolutionary theory suggests that maternal grandparents (MGP) should affect breastfeeding duration differently than parental grandparents (PGP), due to the difference in probability of biological relatedness.

Data were collected in a rural Polish population as part of an ongoing longitudinal study conducted since 2003 at the Mogielica Human Ecology Study Site. A questionnaire was used to collect information on women's reproductive history and on household composition after their marriage. In order to compare the impact of grandparents, for the analysis we selected women who lived after marriage in a household with at least one of their own parents (N=148) or with at least one of their husband's parents (N=245).

The average duration of breastfeeding differed depending on which grandparents were present in a household. Mothers who raised children in the presence of co-residing MGP breastfed their children longer than did mothers co-residing with PGP (8.5 vs. 7.0 months, P=0.001). The observed difference did not depend on the sex of children. The presence of MGP positively influenced the duration of breastfeeding for both girls (8.8 vs. 7.4 months, P=0.001) and boys (8.8 vs. 7.3 months, P=0.001). Living with MGP or with PGP did not influence the differences in average inter-birth intervals (IBI) (P=0.62).

Our findings support the hypothesis that paternity uncertainty may differentiate grandparents' offspring investment strategies. These results may indicate that MGP, whose interest lies in improving the 'quality' of grandchildren, support their daughters during breastfeeding, e.g. by sharing with them their experience and reducing their workload. A potentially lower level of genetic relatedness to patrilineal descendants of PGP may result in them having a lesser interest in encouraging women to extend the duration of breastfeeding. Though we do not find evidence for IBI changes as a result of breastfeeding practices in this study, in natural fertility populations variation in breastfeeding duration may affect average IBI, therefore a presence of PGP could have resulted in a greater quantity of children.

### **8.4. Olena Lutsenko.**

The relations between "new relatives" after joining up the families: parents-in-law, daughters-in-law, sons-in-law in Ukraine.

This research is devoted to studying emotional relations and its connection with personality features of young and old people, who became the relatives-in-low. This new relations have some universality like stereotypical conflicts and defense behavior of the parts. Reflection of this meets in folklore. This universality points at the underlying evolutionary regularities. We carried out two series of researches. The first series included a psychodiagnostic exploration of 30 young and middle age couples. It was studied the personality traits of this couples and their attitudes to their parents-in-low by three psychometric tests. In the second series we explored 50 elder couples, which have the married sons and/or daughters. We used the same methods for studying this sample. The research methods. Semantic Differential by Charles E. Osgood in Russian adaptation - for evaluating emotional attitudes to the new relatives. BIV (Biographical Inventory) by Bottscher, Jager, Lischer in Russian adaptation - for studying personality, biographical and social-psychological traits. Locus of Control Scale by J. Rotter in Russian adaptation - for measuring a level of internality/externality. The connections between personal traits and attitudes were examined by Spearman correlation analysis. The Mann-Whitney test was done for the comparing relationships in the groups. As a result of the first part of research it is revealed: 1) on the whole sons-in-low relate to their parents-in-low more positively than daughters-in-low, especially to their mother-in-low. They less sympathize to the father-in-low. The daughters-in-low apprehend their parents-in-low more coldly, especially their mother-in-low. 2) In a young family the females have more internal locus of control, that is they taking the responsibility for their family at themselves. In the second part of research it is revealed: 1) the wife parents relate to their sons-in-low more positively than the husband parents relate to their daughters-in-low. The husband parents are more unite in their assessments of the daughters-in-low. However the wife parents differ in their evaluation of theirs sons-in-low power: the fathers-in-low think about they as a weak men. 2) In the elder generation the fathers-in-low have more internal locus of control than the mothers-in-low. In the results of both parts of the research we found out the set of significant correlations between attitudes and the traits of

extraversion, neurotism, force of Ego, social activity, childhood situation, social status. Our results can be explained by evolutionary-psychological regularities, for instance, uncertainty of fatherhood, competition between the men for the leadership and so on.

### **8.5. Gretchen Perry, M. Daly & J. Kotler**

The shift to “kin care” in child protection.

Child protection agencies in modern nation states are empowered to remove maltreated children from their homes. Until recently, such children were placed preferentially in the homes of unrelated foster parents, and almost never with kin, but in recent years kin caretakers (predominantly grandmothers and aunts) are increasingly relied upon. This change in practice is often justified with reference to benefits of being cared for by kin: the change is often emotionally easier for the child, and relatives are believed to care more deeply about the individual child than do unrelated caretakers. However, it can be argued that the real reason for the shift is necessity: the numbers of children in need of care have risen while the numbers of willing foster parents have fallen. Although evolutionists might expect that being cared for by kin rather than foster parents is beneficial to children, the evidence is not yet in. Our poster reviews the history of this change in child welfare practice and the considerations described above, then presents some initial results of our own ongoing study of placement practice and its sequelae in one Ontario child protection agency.

### **8.6. Sangkwon Woo, M. Flinn, M. Hamilton & R. Walker**

Socioecological conditions, polygyny, and marriage arrangements in hunter-gatherer societies.

Marriage systems vary in response to ecological conditions. Among hunter-gatherer societies, the equity of social power appears related to mate choice decisions, in particular the extent to which parents and kin are involved in arranging marriages. Here we examine relations among social hierarchy, degree of polygyny, and kin regulation of marriage in hunter-gatherer societies. We present a synthesis of results from two publications (Walker et al, 2011, in prep.) with the addition of information on the distribution of social power and material resources. Methods and sample: We examine a cross cultural sample of 138 hunter-gatherer societies. Codes for degree of polygyny are from Binford (2001); arranged marriages are from Apostolou (2007). Codes for distribution of social power and inheritable/noninheritable resources were made from original ethnographic sources. Results: (1) polygyny is associated with arranged marriage. (2) inequity of social power and resource distribution are associated with polygyny & arranged marriage. Walker, R.S., Hill, K., Flinn, M.V., & Ellsworth, R. (2011). Evolutionary history of hunter-gatherer marriage practices. PLoS ONE, 6(4): e19066. Walker, R.S., Flinn, M.V., & Hamilton, M. J. (in preparation). Regulated reproduction in hunter-gatherers.

## **Group 9. Mate choice.**

### **9.1. Jan Antfolk & Pekka Santtila**

Fertility increases aversion to incest and decreases sexual restrictiveness in women.

As some fitness-reducing (e.g. incest) and fitness-enhancing behaviors are directly linked to female fertility (a function of both age and menstrual-cycle), it is expected that psychological mechanisms moderate the likelihood of involvement in such behaviors. For example, it is expected that women in their follicular phase are more averse to incest than women in their luteal phase. To study this, we surveyed 400 women obtaining self-report information on their menstrual-cycle position and age, their reaction to first-person (e.g. the respondent having incest with their brother), second-person (e.g. the respondents sister having sex with their brother), and third-person (e.g. a woman having sex with their brother) incest descriptions, their self-reported sociosexuality and their disgust-sensitivity in three functional domains (pathogen, sexual and moral disgust; Tybur, Lieberman & Griskevicius, 2009). Supporting our hypotheses, we found that women in their follicular phase reported higher aversion to first-, second-, and third-person incest, while being less sexually restrictive than women in their luteal phase. Moral disgust was not associated to fertility as a function of menstruation-cycle. We also found that age was negatively associated with incest, but positively associated with moral disgust. Results and limitations will be discussed.

## **9.2. Ani Bajrami**

Sexual selection or cultural selection: mate choice in Albanian population, Greek minorities and cultural community of Roma and Aromanian.

Memotypes are memory structures that extract and deposit certain information, alike the genes. They also produce their by-products or else the effectors, which are expressed in the form of a preference or non-preference in the selection of a partner, being that one feature or a set of features. In all other similar cases, where the behavior as a function, is formed according to the information deposited in the brain, functional units known as cultural modules are formed. This study reveals how the selection affects cultural modules and as a result the human evolution related to mate choice, is determined from the cultural selection. The opinion has been based in the statistical figures generated from the study of albanian population (N=151), greeks (N=151), aromanians (N=98) and roma community (N=67) that have lived together for centuries in Gjirokastra, in a region with 60 thousand inhabitants, located in Southern Albania. The figures show that the patterns of preferential features in partner' selection do not have statistically acceptable differences among the males and females. For instance, the preferences for better financial incomes, which according to the theory of sexual selection, is expected to be higher among the females, in our study appears to be almost the same, still in Albanian and Greek males the values are fairly higher than the females. A similar situation is also observed in the social study regarding the sexual attraction. Even though the variation is not statistically significant, compared to females, the Greek and Romanian males prefer a well-established social status. The trait of sexual attraction is relatively equal in both females and males alike, in all four ethnic groups involved in the study. In almost all the studied traits (in 37 ethnic groups), there are no statistically convincing variations among both sexes. This fact leads us to think that partner selection is based on the cultural selection acting upon cultural modules. keywords: sexual selection, mate choice, cultural modules, cultural selection, memotype, mediotype.

## **9.3. Andreas Baranowski & O. Vitouch.**

The science of seduction: teaching seduction techniques and evaluating their effectiveness.

**Aim:** With the publication of the book "The Game" by Neil Strauss in 2005, the seduction community was brought into mainstream. Dating back to the 1970s in the U.S., the community is dedicated to finding methods on how to systematically seduce women. The theoretical background builds on evolutionary psychology, combined with techniques reminiscent of NLP (see, e.g., Strauss, 2005; Benedict, 2009). This instantly raises two questions: Do these techniques work, and can the evolution-based seduction models be extended to both sexes. To find out, separate trainings were organized for men and women, and evaluated in real-life interactions.

**Method:** In a one-group pretest-posttest study, N = 40 subjects (17 men, 23 women) were trained to improve their dating skills. The treatment consisted of one session lasting 5-6 hours and including instructions, modelling, role playing, and coaching, followed by homework. The focus was on teaching skills that are predicted to work by the seduction community and evolutionary psychology alike. To operationalize success, male participants had to acquire as many phone numbers as possible from members of the opposite sex within one hour (both before and after training). Women had to obtain as many drink invitations as possible, respectively. A questionnaire was used in addition for assessing changes in self perception. **Results:** Participants described themselves as, and actually were, significantly more successful with the opposite sex. Men improved from an average of one phone number per hour to more than three numbers. Women received 1-2 drink invitations before and three after the training. Men also described themselves as significantly more attractive, intelligent, open-minded, and confident, but also as more selfish and dominant, in the posttest phase. Women indicated that they felt significantly more intelligent and confident, but less responsible and honest. **Conclusions:** Findings will be discussed regarding their comparability to studies evaluating heterosocial skills training (see Strachan & Hope, 2002). Generally, the results are in line with current research showing that short-term interventions can help to improve dating skills. We argue that evolutionary psychology can be used to teach people how to improve their skills with the opposite sex. Such a "prescriptive" approach would be new to a scientific field which so far has mostly been descriptive and predictive. Ethical implications will be discussed, including the role of traits with a traditionally negative connotation (such as selfishness, machismo, and dishonesty) for the "dating game".

#### **9.4. Melissa Barkat-Defradas**

Speech tempo: an honest signal for selecting mate for reproduction?

Humans vary in how they produce speech, and those differences can depend on a number of factors such as geographical origin, mood, education, gender, age, etc. As for speech tempo (i.e. speaking rate, that is articulation rate including pauses), researchers have long recognized that variation in speech rate is a way, among others, of marking individual speaker characteristics and telling something about psychological traits of personality and affective state. With regard to gender, most available evidence suggests that men actually speak somewhat faster than women do. Moreover, because of the inverted correlation existing between speech velocity and articulatory precision, women articulation occurs to be more precise, that is closer to the ideal phonological targets of a given language. In the frame of sociolinguistics, it has previously been claimed that women use of formal forms is due to their strong investment in language transmission, specifically as maternal speech clarity enhances infant speech perception performance. Articulatory precision in women is thus perhaps an honest signal that their children will have a good language performance, a socially important quality. Thus women with high articulation precision should be preferred for a long-term mate, as compared for a choice for a short-term mate. Five utterances produced by 14 female native speakers of French were manipulated to simulate either a low or high articulation precision. 150 male judges were allowed to choose among random pair of manipulated voices from different women, for either (on a random basis for each judge) a one-night stand or a family foundation. Results are discussed in the context of the evolution of language and its sex-specialization in relation to sexual selection. Keywords: vocal cues; sexual selection; speech tempo, voice assessment, honest signal.

#### **9.5. Julien Barthes, B. Godelle & M. Raymond**

Social stratification and the evolution of male homosexual preference

Male homosexual preference (MHP) is a Darwinian puzzle, since male-male preferential relationship implies a lower offspring number, and sexual orientation is partially heritable, with a moderate, primarily genetic, familial effect. Curiously, despite many reports of homosexual behaviours in other animals, MHP seems restricted to humans. Several evolutionary explanations have been proposed for the maintenance of genetics factors that promote male homosexual preference. Empirical evidence supports the idea that a sexually-antagonistic heritable factor which promotes male homosexual preference and increases fecundity in female is maintained in the population. Why such factor is restricted to the human species remains unsolved. Human societies are often characterized by a class stratification (unique among animals), connected by sex-asymmetric migration, particularly a women up-migration (hypergyny). We hypothesized that such structure enhances the evolution of a sexually-antagonistic genetic factor, and could promote the maintenance of MHP in human populations. Individual-based models were built with a hierarchically structured population (3 classes), and the evolution of a sexually-antagonistic genetic factor was studied. This factor decreases the probability to find a reproductive mate for a male, and it enhances fecundity for women. Additionally, for a woman, an increased potential fecundity increases her probability to up-migrate. As expected, the social stratification favours a more ‘feminized’ value of the sexually-antagonistic genetic factor, despite a higher cost in men, corresponding to a higher MHP prevalence. Various parameters are also explored, such as differential polygyny between classes, population size, mutation rate, etc. The modelling suggests clear predictions on the prevalence of MHP across culture and social classes (some preliminary data to test some predictions are presented), and a way to understand this human specificity.

#### **9.6. Charlene Belu & L. Honey**

The women your mother warned you about: Dominance, sociosexuality and the Dark Triad.

Various studies have revealed correlations among the traits of dominance, sociosexuality and physical masculinisation in women but none have explicitly explored relationships among all these variables at once. We hypothesized that social dominance is predictive of female sociosexuality and may be mediated by physical and behavioural masculinization. A large sample of women (n=445) completed an online study where participants completed the dominance subscale of the California Psychological Inventory (CPI) and the Rank Styles With Peers measure (RSPQ) which includes three separate components related to Dominant Leadership (DL), Coalition Building (CB) and Ruthless Self-Advancement (RSA). Participants also completed the Sociosexuality Inventory (SOI) and the Sex Drive Questionnaire (SDQ). Further, participants completed the concise Dark Triad scale (DT) which includes subscales for Machiavellianism, Psychopathy and Narcissism. From the online data, we invited a

subset of women into the lab who had the highest (n=27) and lowest (n=23) scores on the dominance subscale of the CPI. These participants were photographed and had their dominant hands photocopied so that we could calculate Eye-Mouth-Eye angle and 2D4D digit ratio. Regression analyses revealed that high SOI scores were best predicted by high sex drive, high scores on the Dark Triad, and low scores on Coalition Building ( $R^2 = .283$ ,  $F(3,419) = 54.652$ ,  $p < .0001$ ). Further analyses using subscales of the DT indicate that Machiavellianism and sex drive explain most of that variance in SOI score ( $R^2 = .278$ ,  $F(2, 406) = 77.812$ ,  $p < .0001$ ). When we compared High CPI participants with Low CPI participants, we did not find differences in SOI score, but High CPI females did tend to have higher sex drive ( $F(1,44) = 3.946$ ,  $p = .053$ ) and higher Dark Triad scores ( $F(1,44) = 3.064$ ,  $p = .087$ ). We found no evidence of differences in EME or 2D4D ratio between these groups. Thus, dominance as measured by the CPI or RPSQ was not found to be predictive of sociosexuality in women, but may be indirectly linked to sociosexuality through the traits of Machiavellianism and high sex drive. Further exploration, and clear definition, of social dominance as an important factor in mating strategy is necessary.

### **9.7. Jeanne Bovet, A. Alvergne, B. Godelle & M. Raymond**

#### **Female attractiveness and paternity confidence.**

In humans, both females and males choose their partner, because they both invest in offspring. Numerous studies have shown that female mate value is linked to several cues of age, health, fertility, fecundity and parity. All these traits are independent of the mate seeking male. Nevertheless, some features of attractiveness could be relative (differently evaluated by each judge). Non-exclusively, recessive traits in a female, for which a male display a dominant variant, could be ultimately attractive because they enhance paternal resemblance and thus paternal confidence. Recessive characters would be attractive to males in monogamous species where paternal investment is high, and cuckoldry represents a significant risk to male fitness. An alternative hypothesis is homogamy, which predicts that individuals are attracted by a resemblance reflecting an optimal genetic similarity. To test these hypotheses, we used real photographs of young women of comparable overall attractiveness, and judges (men) were asked to choose the more attractive face between randomly paired women. Both women and judges were typed for a set of facial features with a mendelian inheritance. No clear tendency toward a preference for recessive characters was apparent, even taking into account the features of the judges. As too many variables are operating on real faces, a second experiment was conducted with artificial faces differing only by the recessive/dominant state of five traits. Results showed a significant tendency toward homogamy. Homogamy is also found within real couples having started a family. Results are discussed in the context of the evolution of relative attractiveness in humans.

### **9.8. Gayle Brewer & D. Rigby**

#### **Female intra-sexual competition.**

The importance of partner selection and retention suggests that some level of intra-sexual competition may be beneficial for both single and partnered women. Two studies were conducted to explore the competitive behaviors employed by women and the rival characteristics that promote competition. In study 1, heterosexual women aged 17-35 years ( $N = 326$ ) completed a revised version of the Competition Between Women questionnaire (Joseph, 1985). Factor analysis revealed five aspects of female intra-sexual competition (Attention to rival's flaws; Ability to attract male partners of rival females; Inspection of rival females and comparisons with self; Need for acknowledgement and admiration; Willingness to engage in competition). Differences between single and partnered women were identified for each aspect of competitive behavior, with single women reporting the greatest levels of competition. In study 2, heterosexual women also aged 17-35 years ( $N = 150$ ) read one of six vignettes describing a situation in which her romantic partner talks to a rival female. The extent to which three rival characteristics (attractiveness, sexual interest and availability) influenced the propensity to behave competitively was investigated. The characteristics of the rival female clearly impacted on women's competitive behavior. In addition, important differences between single and partnered women were identified. The current studies illustrate the types of competitive behaviors employed by women and the manner in which the characteristics of a rival may influence the competitive response. Differences identified between mated and non mated women suggest that women may attend to different threats and engage in different behaviors when focused on the acquisition or retention of a mate.

### **9.9. Lorne Campbell & C. Wilbur**

What do women want? An interactionist account of women's mate preferences.

We investigated the moderating influence of individual differences in women's sociosexuality on romantic preferences within three specific relationship contexts. Female participants were presented with four prospective mates, varying in their ambition and attractiveness, and were asked to rate interest in these targets as short-term sexual partners, as casual dating partners, and as long-term romantic partners. Short-term sexual appeal largely rested on targets' attractiveness, particularly among women with an unrestricted sociosexual orientation. Dating appeal was dependent on attractiveness, particularly among unrestricted women, and on ambition. Ambition and attractiveness synergistically influenced targets' long-term desirability, and these preferences were not moderated by women's sociosexual orientation. These findings portray the textured manner in which sociosexual orientation shapes women's mate preferences and underscore the need to delineate different types of short-term relationships. We advance an interactionist framework that considers how women's dispositions and the traits of potential mates jointly operate to influence romantic preferences within distinct contexts.

### **9.10. Mary Louise Cowan**

Nobody's perfect. The relationship between intelligence, physical attractiveness, and funniness.

Miller (2008) proposed a theory of Mating Intelligence suggesting that individuals who are high in genetic quality, as demonstrated by their physical attractiveness, should also be high in mental signs of fitness, such as intelligence and humour production. The current study investigated how physical attractiveness, intelligence, and funniness relate to each other. In Study 1, an IQ test was administered to participants. Participants were then filmed while answering a 'desert island' scenario question, designed to provide them with the opportunity to be creative and funny. The videos, along with a photograph of each participant, were shown to raters in Study 2, who rated each actor in the photograph and video for attractiveness, intelligence, and funniness. The results found that, in the photographs, raters perceived physical attractiveness to be positively related to funniness, demonstrating a halo effect. Physical attractiveness was however not related to humorousness in the videos although attractiveness was found to be negatively associated with IQ scores. Humorousness in the videos was not found to be significantly related to either intelligence or attractiveness therefore the study did not find evidence in support of Miller's (2008) theory of Mating Intelligence.

### **9.11. Kara Crossley, T. Pollett & M. Tovee**

Changes in body weight predict attractiveness ratings in male and female bodies which vary in leg and torso length.

Several studies have suggested that varying the ratio of the leg to torso in human bodies modulates attractiveness judgements. However, previous studies have held height constant and altered leg length (which means that torso is correspondingly altered). The assumption is that longer legs are more attractive, because they signal greater health. Longer legs indicate better childhood nutrition and shorter legs have been associated with adverse health problems. However, previous studies have not differentiated between changes in leg length and torso length in producing changes in attractiveness as they have co-varied in the image sets used. Moreover, body weight has long been known to covary with relative torso and leg length. Could it simply be that the bodies are rated as more or less attractive because their apparent body weight changes? Male and female bodies were generated in Daz Studio 3.0 (Daz3D.com) using the Michael 4.0 and Victoria 4.2 models. Three sets of images were created for each body. One in which the leg length was altered, one in which the torso-leg length was altered and one in which both torso & leg length were altered. Participants rated the images on an online questionnaire (Qualtrics.com). Three different versions of the questionnaire were run, with the subjects rating the images for body weight, age or attractiveness. To determine which features predict the attractiveness judgments for female images we ran a non-linear, step-wise, multiple regression using as predictors height, torso length, leg length, leg-torso ratio, estimated age and body weight. Analysing the ratings for all the female images in one set, the regression accounted for 87% of the variance and body weight was the primary predictor accounting for 66% of the variance. Analysing the three subsets of images separately, we again found that the primary predictor of attractiveness was body weight. Analysing the ratings for all the male images in one set, the regression accounted for 68.5% of the variance and body weight was the primary predictor accounting for 66% of the variance. Analysing the three subsets of images separately, we found that the only significant predictor of

attractiveness was body weight. This study suggests that longer legs and shorter torsos are rated as more attractive. However, our results suggest that it is changing body weight that is being assessed. Altering the proportions of the body also alters its apparent body weight and it is that change that alters its perceived attractiveness.

### **9.12. Marilu Cruz & R. Brito**

#### **Characteristic of real and ideal partners in menopause women in Belem-Brazil**

Relationships, choice of partner and satisfaction have been important subjects in Evolutionary Psychology. Some patterns have been found with preference in the choice of partner, for example, for stability and indication of good parental investment. Furthermore, the research showed that social context and culture can change very much the behavior pattern according with the great human adaptive capacity. However, the majority of the current research investigates just women in reproductive period, being the data with women in menopause very broad and uncertain. Thus this research has the objective of investigating these themes with women in menopause, comparing with women in reproductive period. The subjects are 240 women living in Belém-Pará-Brazil and Naples-Campania-Italy. The data will be collected though of a self-applicable questionnaire, using the snowball method. The questionnaire will be question about social date of the women and the partner, like age, education, income, about the relationship, how time, cohabitation, kind of relationship, about satisfaction with the relationship, as affective as sexual, for exempla, about characteristic of a ideal partner a real partner, and about the characteristic important when choice a long-partner or a short partner. Expected results will provide an overview about what kind of relationships women in menopause have, what it's important in the partner and if these relationships are satisfactory or not. The study will also give a first idea about possible influences of different culture in women behavior, enabling understanding if the results will be a consequence of pattern evolutionary of menopause or culture adaptation. This is a work in progress.

### **9.13. Morgan David & L.-A. Giraldeau**

#### **The role of personal information in human mate-choice copying.**

The use and treatment of information about potential mates is crucial to an individual's reproductive success. When choosing a mate, animals can rely on two different types of information. On the one hand, they can base their assessment on individually-acquired information (personal information) or, on the other, they can use information provided by conspecifics to infer the quality of potential mates (social information), a phenomenon known as 'mate-choice copying'. Studies conducted with animals have provided good evidence that reliance on social information increases when personal information is lacking. The benefits of copying conspecifics' mate-choice is thus thought to lie in the opportunity to acquire and use information about potential mates without paying the costs of a time-consuming, and possibly inaccurate, personal assessment. Although increasing evidence shows that mate-choice copying also occurs in humans, no study so far has attempted to determine what decision rules influenced the differential use of personal and social information in women. More specifically, it remains unknown whether women tend to copy more with decreasing personal information when rating a potential partner. We designed the current study to determine whether the quantity of personal information available to women predicted their reliance on social information from other women. Each subject was asked to rate photographs of men based on physical attractiveness and desirability for short and long-term relationships. One month later, each was asked to rate again two photographs of previously seen men, presented in two different conditions. One was associated with a short description of his hobbies, job, etc., and with the photograph of a woman supposed to be his partner (the 'personal information' treatment). In the second treatment, photographs of men were also presented with their pseudo-partner but without any description of hobbies or jobs etc. (the 'no-personal information' treatment). We expected that women's ratings would more likely be influenced by presence of a female partner when the subject had no access to any of the man's personal information. We found strong evidence that the presence of the female partner increased a man's attractiveness and desirability for both short and long-term relationships. Although the absence of personal information consistently increased the influence of the female partner on subject's ratings, the difference with the 'personal information' treatment hardly reached statistical significance. We provide suggestions to investigate the costs and benefits of human mate-choice copying in further studies.

**9.14. Peter Etchells, A. Clark, J. Burn & I. Penton-Voak.**

Assessing dynamic predictors of human gait attractiveness.

Human gait provides easily accessible information when forming initial social impressions of a person. While some studies have shown that attractiveness judgements of human body movements may reflect mate quality (e.g. Brown et al., 2005), the majority of research in this area still concentrates on static cues to attractiveness. Recently, motion-captured ‘point light walker’ stimuli have been used to show that women who are rated as being highly attractive display a prototypical ‘cat walk’ style of movement (Troje, 2003). In such studies, attractive walks are not explicitly manipulated, and such labelling arises out of the subsequent data analysis. Here, we present a new methodological approach, aimed at determining whether there are quantifiable differences between normal and attractive walks. Motion capture data of ten female walkers, walking both normally and proactively, were obtained. Subsequently, point light walker animations from these were presented to observers, who were asked to rate the attractiveness of each walk and walker. This methodological approach allows for the biomechanical analysis of walking movements alongside more traditional assessments of attractiveness.

**9.15. Ana Maria Fernandez, M.A. Corrêa Varella, J.H. Benedetti Piccoli Ferreira, I. Bertelli Cabral dos Santos & M. Dufey**

Sex-differences in the forced-choice infidelity scenarios among Chilean and Brazilian Students.

The proposal of a sexually differentiated jealousy mechanism (SDJM) has been extensively documented throughout the years, with the universal forced-choice finding that given the possibility of an infidelity from a partner, men are more distressed by women’s sexual infidelity and women being more disturbed by emotional infidelity (Buss, 2009). Indeed, mating poses different reproductive motivations, conflict, and negotiation in the reproductive relationships between a man and a woman. Parental investment is asymmetrical among the sexes women have a higher cost than men in reproduction, making them more selective and commitment-resource seekers than men. Males, on the other hand, have a lot to win (adaptively thinking) by maximizing sexual access to the opposite-sex, but they have a lot to lose from sexual cuckoldry (Buss, 2009). In Hispanic countries the SDJM effect has been acknowledged in Argentina and Chile; and in Spain, one study found evidence in accordance to the SDJM (Fernandez et al., 2007), though Garcia et al. (2009) recently found null results for the forced-choice results. More specifically, in Chile, a previous comparison simultaneously applied in a local and a Spanish University, show results favoring the SDJM not only with the forced-choice, but with an overall averaging operation of the cumulative effect (Fernandez et al., 2006). In Brazil, there is one contradictory report of the SDJM using the forced-choice and a continuous rating method that found only more distress to sexual infidelity in men, but no differences in the distress of women (de Souza et al., 2006). Thus, the current study looked at the SDJM effect in a large sample from various private and public universities in Chile (453) and compared it with a similar Brazilian university sample (303), evaluating the cumulative response to the seven scenarios that Buss et al. (1999) developed. The results showed the expected SDJM using the continuous measure and only five out of seven forced-choice responses that support the predictions. The results discuss the implications if this findings methodologically and conceptually, attending to country differences and language caveats. \*This presentation has been supported by Fundación Ciencia y Evolución, Chile.

**9.16. José Henrique Ferreira, A.M. Fernandez, M.A. Varella, K. Celis & N. Cordova**

Sex-differences in Chile and Brazil: age and context refine the evolved features of mate-seeking.

Based on Sexual Selection theoretical tenets, cross-cultural research has extensively documented sex-differences in the mating psychology of men and women which affects their biased motivations to seek short-term (ST) and a long-term (LT) romantic partner, respectively. Parental investment predictions specified by Symons (1979) and later incorporated to the Theory of Sexual Strategies (Buss & Schmitt, 1992) have been studied in varying countries and samples over the years, beginning by the classic work of Buss (1989) and the latest survey of Schmitt et al. (2003). To refine these differences considering the evolved implications that age may have in the motivation to seek out sexual access to a mate, we evaluated two South American countries that speak different languages. Older individuals were expected to have a more marked motivation to search for a reproductive mate than younger individuals, regardless of overall sex-differences in mate search. College students from Chile (460) and Brazil (192) participated in the study, indicating the degree of current ST and LT mate seeking, their sociosexuality and how strongly they would consider having sex with someone known for five years, one year, six

months, a month, a week, and one day. Similarities across both countries in the men and women asymmetries reaffirm a stronger male motivation for attaining potential reproductive access, which tends to reach a similar level of that of females at about 5 years of knowing someone in both samples. Differences between the countries emerge with Brazilians seeking a mate more strongly than the Chileans, independent of the temporal context and related to age. The implication of age affecting this evolved feature of mating adds-up to the confirmed sex-differences in seeking reproductive access and sociosexuality. Older individuals may not only be more experienced, but having a stronger motivation to find a reproductive partner more imminently. \* This research was possible thanks to the support to the second author from Dicyt Project# 2081093 from Universidad de Santiago de Chile.

### **9.17. Maryanne Fisher & Sarah Shaw**

Intrasexual competitive strategy use as perceived by targets.

In this study, we are exploring how one has experienced, as the target, other's uses of strategies for intrasexual competition for mates. Previously, it was found that there are four strategies used for this purpose: self-promotion, competitor derogation, competitor manipulation and mate manipulation. However, seemingly all work on intrasexual competition has been conducted from the perspective of the perpetrator. In the current study, we shift the perspective that of the target. Since prior work has found self-promotion to be the most used strategy, followed in order by competitor derogation, competitor manipulation and mate manipulation, we hypothesize that participants will recall the most experiences for self-promotion, and the least for mate manipulation. However, it might be difficult for participants to determine whether a rival has self-promoted, rather than simply engaged in self-improvement; targets might thus dismiss actions of rivals who perform this strategy. Given that mate manipulation is also usually oriented towards one's (potential) mate, it is likely that same-sex rivals are rarely the targets of this strategy. Therefore, it is possible that targets might recall the most experiences for competitor derogation, then competitor manipulation, since these two strategies are directed towards rivals. We performed a qualitative study whereby we defined each of strategies, and provide an example of a tactic someone might perform for each. Then we ask participants to list the ways they have experienced this behaviour as a target, who it was by, and to provide some details about the behaviour. Content analyses via thematic analysis indicates that targets are most aware of competitor manipulation, followed by self-promotion, competitor derogation and mate manipulation. We will present our findings with respect to sex differences as they apply to specific tactics within each strategy. Future lines of inquiry will also be presented.

### **9.18. Kelly Gildersleeve & D. Frederick**

Sex, age, and bargaining power within the mating market.

Numerous studies have shown that men tend to pursue women younger than themselves as long-term relationship partners, whereas women tend to pursue men older than themselves as partners. In addition, studies of personal advertisements have generally found that older men are more demanding than younger men (e.g., requesting a larger number of desirable attributes in potential partners), whereas older women are less demanding than younger women. This pattern may reflect a tendency to adjust one's demands upward or downward in accordance with one's bargaining power within the mating market. It remains unclear, however, whether associations between age and demandingness reflect changes in ideal preferences with age or merely a shift in outward behavior in response to constraints imposed by the mating market. The present study examined the effect of age on men's and women's specific mate preferences and tested whether age effects on mate preferences were moderated by the extent to which an individual possessed other attractive traits. We asked nearly 25,000 18- to 65-year-old men and women taking part in a larger survey on MSNBC.com to rate the desirability of various characteristics (e.g., good looking, has a steady income) in a long-term partner. Consistent with previous research, approximately twice as many men than women rated good looks as "absolutely essential" ( $d = 0.34$ ), whereas nearly four times as many women than men rated steady income as absolutely essential ( $d = -1.07$ ). Controlling for own income, men's preference for a partner with a steady income decreased with age ( $p < 0.01$ ), whereas women's preference for a partner with a steady income increased slightly with age ( $p < 0.01$ ). Both sexes' preference for a good-looking partner decreased with age ( $p < 0.01$ ); however, a marginally significant interaction suggests that the negative effect of age on preference for good looks was less pronounced among higher-earning men than among lower-earning men ( $p = 0.06$ ). In sum, results were inconsistent with the notion that women become generally choosier and men become generally less choosy with

age. Instead, these results suggest that older women maintain high standards for those partner traits that may have most directly contributed to children's (and grandchildren's) survival in our evolutionary past. In addition, change in men's mate preferences with age may depend on the extent to which men possess other attractive traits. Discussion will focus on the usefulness of a "mating market" perspective for studying variation in mate preferences.

### **9.19. Ian Holliday, O. Longe, J. Thai, P. Hancock & M. Tovee**

Central representation of female body-shape attractiveness: an fMRI study.

In perceptual terms, the human body is a complex 3d shape which has to be interpreted by the observer to judge its attractiveness. Both body mass and shape have been suggested as strong predictors of female attractiveness. Normally body mass and shape co-vary, and it is difficult to differentiate their separate effects. Platek & Singh (2010) suggested that altering body mass does not modulate activity in the reward mechanisms of the brain, but shape does. However, using computer generated female bodies, based on a Principal Component Analysis of real female bodies, we were able to construct images which covary with real female body mass (indexed with BMI) and not with body shape (indexed with WHR), and vice versa. Twelve observers rated these images for attractiveness during an fMRI study. The attractiveness ratings were correlated with changes in BMI and not WHR. Our primary fMRI results demonstrated that in addition to activation in higher visual areas (such as the extrastriate body area), changing BMI also modulated activity in the caudate nucleus, part of the reward centres. This shows that BMI, not WHR, modulates reward mechanisms in the brain and this has important implications for judgements of ideal body size in eating disordered individuals.

### **9.20. Iris J. Holzleitner, E. Oberzaucher, L.S. Pflüger & K. Grammer**

Matching pairs. Perceived and anthropometric similarity in a rural sample of long-term mates.

That "birds of a feather flock together" is not only part of folk psychology, but has been backed by empirical findings showing that mates across different taxa pair up in a number of traits. Positive assortative mating also seems to apply to humans. Previous studies finding spouses to look more similar based on facial photographs provided, however, only indirect evidence for mate resemblance. Next to the question whether couples are perceived to look more similar (1), we thus investigated the following questions: Are couples more similar in facial shape (2), and is our perception of similarity based on shape (dis-)similarity (3)? Using standardized facial photographs of spouses at a post-generative stage, and pictures of the spouses at approximately the age they married, we conducted three studies: Study I dealt with the perceived similarity of couples and randomly paired people (n=31 couples), Study II examined anthropometric (dis-)similarity in facial shape using geometric morphometric methodology (n=57 couples), and Study III aimed to integrate both perception and measurements (n=24 couples). Replicating previous findings, we found spouses to be perceived to look more similar (Study I). Study II showed that long-term mates are less dissimilar (i.e., more similar) in facial shape, but only regarding eyes and mouth region. In Study III, we were able to show that - contrary to previous reasoning - our perception of facial similarity is not only the result of an overall match in mate attractiveness, but seems to be partly based on an objectively quantifiable trait: shape (Study III). Our findings indicate that there is indeed positive assortative mating for facial traits. Still, findings were relatively subtle, and although we found spouses to be more similar on average, they are not necessarily the most similar of all possible combinations. Results are discussed in the context of trade-offs in mate choice, and possible evolutionary advantages of homogamy.

### **9.21. Nadine Hugill, B. Fink, N. Neave, A. Besson & L. Bunse**

Women's perception of men's sensation seeking propensity from their dance movements.

Risk-taking behaviour in men, an expression of the more general personality trait sensation seeking, has been hypothesized to be an evolved aspect of male psychology that arose through sexual selection. Sensation seeking could be seen as a costly behavioural trait that signals a man's health and vigour and is preferred by women. This study extends knowledge about risk-taking as a cue in human mate choice by examining whether women can perceive men's sensation seeking propensity (assessed with the Sensation Seeking Scale Form V; SSS-V) by viewing their dance movements. We videotaped 50 men's dancing and had 60 women judge each dancer on perceived attractiveness and risk-taking. A positive and significant correlation was found between women's attractiveness judgments and male's SSS-V total score, thrill and adventure seeking, disinhibition and boredom susceptibility. Further, women's risk-taking judgments were related to men's boredom susceptibility. We conclude that (i) male sensation seeking propensity is signalled via their dance movements, and (ii) women are

sensitive to these cues as they consider men who score high on sensation seeking as attractive. We discuss our results with reference to the evolutionary psychology concept of sexual selection and mate preferences.

### **9.22. Vera Kempe & F. Moore**

Do women prefer faces of athletic or of verbally fluent men?

It has been suggested that verbal abilities may increase fitness if women select mates on the basis of these abilities, among other things. Here we investigate whether athletic or verbal abilities have higher fitness-enhancing effects. One way to examine this is to capitalise on the idea that humans are able to identify certain abilities and traits from facial features. If athletic and verbal ability can be gleaned from the face, then attractiveness ratings can reveal which one of these abilities is preferred in a potential mate. In a sample of 23 white Caucasian males, we tested athletic ability, assessed by running time, and verbal ability, assessed by verbal fluency tests. We found a negative correlation between running time and fluency, suggesting that more athletic men also tended to be more verbally fluent. We then created 'more athletic' and 'less athletic' composites from groups of faces matched for verbal fluency, and 'more fluent' and 'less fluent' composites from groups of faces matched for athletic ability. To check whether the abilities in question can actually be identified from faces, 125 women rated the composites for athletic ability, verbal fluency, as well as dominance, masculinity and health. These ratings revealed that the 'more athletic' composite was judged as more fluent and as more athletic than the 'less athletic' composite. The 'more fluent' composite was judged as less athletic, less dominant and less masculine than the 'less fluent' composite. Attractiveness ratings by 86 other women showed that the 'more athletic' composite was considered to be more attractive than the 'less athletic' composite, and the 'more fluent' composite was considered to be less attractive than the 'less fluent' composite. These effects did not interact with respondents' use of hormonal contraceptives, menstrual cycle phase or mating context (short-term vs. long-term). Thus, women identified and preferred athleticism in male faces suggesting that, to the extent that facial attractiveness is a proxy for fitness, male athleticism may be a fitness-enhancing quality. Women were unable to identify verbal fluency in male faces; rather, fluency may be attributed to faces based on an attractiveness halo effect. Nonetheless, faces of verbally fluent men were considered least attractive, perhaps because low verbal ability co-varies with other desirable features like dominance or masculinity. To incorporate verbal ability into their mate choices, women may require direct evidence from speech samples, a possibility that will be addressed in our future research.

### **9.23. Anthonieta Mafra, F. Castro, W.T. Hattori, M.E. Yamamoto & F. Lopes**

How do people perceive themselves in the mate market? The influence of the context on the self-assessment.

Humans chose carefully people who they will be romantically involved. Characteristics which indicate health, age and financial condition are valued, as well as certain personality traits. However, the romantic mate choice is not restricted to the analyses of potential partner. One factor that seems to influence this choice is the self-perception as a romantic partner, because we can expect a search for partners with similar or higher mate market's value than our own. Thus, self-perception and the perception of potential partners can depend on environment. In order to verify whether the context influences self-perception as a romantic partner, 162 undergraduate students from Natal, RN, Northeast of Brazil answered two questionnaires: (1) Self-evaluation according to nine characteristics related to social status, personality and physical attractiveness in a 10-points Likert scale, and approximately 20 days later (2) another Self-evaluation identical to the previous questionnaire but preceded by exposure to eight profiles including photos and personal description of stimulus' subjects that presented the same sex of the participant. The second questionnaire descriptions were presented in eight conditions, each one to a different group of participants. Each was build with similar stimulus subjects with the same financial condition, personality and physical attractiveness. Conditions differed in relation to the intensity of the traits described (high or low value). For analysis, we used the difference between the score of each trait in the first and second questionnaires. In general, the results showed that men and women did not change significantly how they evaluate themselves, regardless of the context to which they were exposed. Although our study did not show that context influenced the participants' assessments, we found that men and women whose self-evaluations were high in the first questionnaire maintained their evaluation in the second one. The same response was found for low self-evaluation subjects, suggesting that self esteem has an important role on self-

evaluation. However, more studies are required to improve our knowledge about the influence that the environment has on a romantic partner choice.

#### **9.24. Melissa McDonald & C. Navarrete**

Toward a psychological theory of female-specific prejudice: Shared mechanisms for protecting reproductive choice in racial and minimal group contexts.

Recent research has shown that bias against Black American men may increase as a function of elevated fertility across the menstrual cycle. Here we demonstrate that the association between fertility and intergroup bias may not be limited to groups defined by race, but may extend to group categories that are minimally defined, particularly when women associate outgroup men with physical formidability. In Study 1, Black and White women displayed greater bias toward outgroup men as a function of conception risk when associations of the outgroup with physical formidability were high. Study 2 replicated these results in a minimal group paradigm. These findings are consistent with the notion that women may be endowed with a psychological system designed to protect reproductive choice. Such a system may generate intergroup bias via information processing mechanisms that rely on group categorization heuristics and perceptions of the physical formidability of outgroup men, particularly when the costs of sexual coercion are high.

#### **9.25. Josephine Mo, K. Cheung, L. Gledhill, T. Pollet, L. Boothroyd & M. Tovee**

Cross-cultural differences in judgments of attractiveness, health and fertility in female bodies by Chinese observers in Rural China, Hong Kong and the United Kingdom.

The preferences for attractiveness, health and fertility for a standard set of photographs of 50 women varying in size and shape were recorded from four sets of observers; 50 Chinese observers in Rural China, 50 Chinese observers in Hong Kong, 50 Chinese observers in the UK and 50 UK Caucasian observers. The results suggest that the Body Mass Index (BMI) is the best predictor of all three judgements in all four observer groups, and shape cues, such as the Waist-Hip Ratio (WHR) and the Waist-Bust Ratio (WCR), seem to play a relatively small role. In all three judgements, the Rural-Chinese observers tend to prefer a lower ideal BMI than the other three observer groups. This is most obvious in the ratings of fertility where the ideal BMI is significantly lower compared to the other three groups. The Rural Chinese also seem to prefer a subtly different body shape (i.e. more curvy), and this is again most obvious in the fertility condition. Although the shape cues play a relatively small role in determining the behavioural judgements, they consistently accounted for a greater proportion of the variance in all three Chinese groups than for the Caucasian observers implying a greater role for shape in the Chinese participants' judgements. This result may reflect the competing pressures between the healthy range for shape and body mass in the Chinese populations which is significantly different from the Caucasian population versus the role of visual diet in influencing body preferences in different cultural environments.

#### **9.26. Fionna Moore, C. Cassidy & D. Perrett**

Financially independent women prefer feminised male faces.

Trade offs in women's partner preferences are contingent upon a number of factors, including relationship status and menstrual cycle phase. Women with high financial independence, for example, express stronger preferences for physical attractiveness in a partner, and weaker preferences for wealth and status. We predicted that financial independence would influence the mate choice trade off inherent in judgements of attractiveness of masculinity (i.e. for masculine cues to heritable immunity and dominance versus feminine cues to investment of paternal care). In Study 1 we found an inverse relationship between financial independence and preferences for masculinity in male faces in a sample of women recruited to an online study. In Study 2 we conducted an experimental manipulation of women's perceptions of their ability to make successful financial decisions and found that those in the 'positive' condition (in which all decisions were pre-programmed to increase a hypothetical sum of money) expressed decreased preferences for masculine male faces. Results of both studies confirm that female mate preferences are contingent upon perception of financial independence, and that financially independent women place less emphasis on cues to heritable immunocompetence and/or dominance in a partner.

### **9.27. Fionna Moore, M. Law Smith, V. Taylor & D. Perrett**

Sexual dimorphism in the female face is a cue to health and social status.

The strong relationship between femininity and attractiveness in the female face has been attributed to the value placed on fertility in attractiveness judgments of women. This is supported by relationships between femininity and measures of health and late follicular oestrogen, as well as between femininity and perceived health and age. Relatively little research, however, has systematically tested the contribution of each to femininity, or individual differences in men's face preferences. In Study 1 we found that preferences for femininity were reduced when health, but not age, was controlled for. We also found a positive relationship between men's ideal number of children and femininity preferences. In Study 2 we found a negative relationship between men's preferences for social status in a partner and for facial femininity. Results suggest that femininity provides cues to multiple traits and warrant further investigation of systematic variation in men's mate preferences.

### **9.28. Ashley Peterson, G. Geher & S.B. Kaufman**

Predicting preferences for sex acts: which traits matter most, and why?

Traditionally, Evolutionary Psychology has focused on discovering human universals and sex differences in human mating (e.g., Buss, 2003; Schmitt, 2008) while ignoring individual differences. Today, the field generally recognizes that there is variability and plurality in mating strategies between and within individuals; with multiple behavioral routes to reproductive success (Simpson & Gangestad, 2000). Recently, individual differences in human mating have been studied; by examining how variability in various personality and dispositional traits reflect variability in underlying mating strategies (i.e., engagement in short-term or long-term mating strategies)(see Nettle & Clegg, 2008). The current study sought to extend this research by examining the relationships between several personality variables, including the Big Five, Sociosexuality, Life History Strategy, and Mating Intelligence, and preferences for particular sex acts (i.e., masturbation, oral sex, vaginal sex, etc.). A sample of 607 individuals (144 males and 463 females) completed these measures and it was found that the traits did predict sexual preferences. Mating intelligence and sociosexuality were more predictive of preferences for different sex acts compared with the Big Five traits and Life History Strategy. In addition, an interesting sex difference emerged where males indicated stronger preferences than females for all of the sex acts except for vaginal sex. Implications regarding the evolution of the highly variable nature of human sexuality are discussed.

### **9.29. Julia Robertson & T. Hussey**

Shorter men have more one night stands: Initial support for the importance of male contests over female mate choice in human sexual selection.

The review article by Puts (2010) entitled "Beauty and the Beast: mechanisms of sexual selection in humans" provides a compelling argument for the importance of contest competition as the main form of mate competition between men, supplanting female mate choice as the primary mechanism of human sexual selection operating on men. The argument posits that where contest competition exists, by which is meant the use of force or threat of force to exclude other same-sex competitors from access to potential mates, other mechanisms of sexual selection become obsolete. Thus, the importance of female mate choice for desirable male traits is either irrelevant or weakened. This study provides an exploratory examination of a possible corollary of the primacy of male contest competition in mating strategy. If force or threat of force was used as the primary male form of sexual selection, it follows that those less successful in this respect may have been excluded from mating opportunities. Phylogenetic evidence (e.g. Macaca mulatta, Macaca fuscata, and Pan troglodyte) suggests that males excluded from mating opportunities employ opportunistic behaviors to enhance reproductive fitness. In this way, subordinate or lower ranking males have been shown to sire offspring in greater numbers than predicted by the priority of access model, so confounding the effects of direct male-male competition. This study investigates the possibility that shorter men, if excluded from sexual opportunities through failure in male-male contest, are more likely to employ such alternative mating strategies. Eighty men, predominantly students and aged between 18 and 50 years ( $SD \pm 8.41$ ) completed the revised Sociosexual Orientation Inventory (Penke & Asendorpf, 2008) prior to measurement of actual height. As predicted, shorter men were found to engage more frequently in one possible measure of opportunistic behavior, that being the number of partners with whom they had had sexual intercourse on one and only one occasion ( $r = -.29$ ,  $p = .01$ ). However, no difference was found between men of all heights in relation to sociosexual attitudes ( $r = -.17$ ,  $p = .07$ ) or desire ( $r = -.06$ ,  $p = .3$ ). It

was concluded that whilst female preference remains an important mechanism of sexual selection in men, the greater opportunistic mating behavior of shorter men provides initial evidence for contest competition and the exclusion of competitors by alpha males through force or threat of force. This exploratory study therefore provides support for further, more comprehensive investigation in this area.

### **9.30. Susanne Röder, B. Fink, P. Matts, R. Johnson & M. Burquest**

Differences in visual perception of age and attractiveness of female facial and body skin.

Perception of age and health is critical in the judgment of attractiveness. The few studies conducted on the significance of apparent skin condition on human physical appearance have studied faces alone or isolated fields of images facial skin. Little is known about whether perception of the face matches that of other body parts or if body skin affects overall age and attractiveness perception when presented in combination with facial skin. We hypothesized that independent presentation of female faces, chests, and arms (including hands) - cropped from a full face and upper body image - would result in significant differences in perception of age and attractiveness compared to the corresponding composite. Furthermore, we sought to investigate whether relatively young and attractive looking skin on selected, individual parts of the body affects overall perception. Digital photographs of 52 women aged 45 to 65 years were collected and processed to yield four derivative sets of images: One set showed the composite of all features, i.e., the face, the chest and the arms, while the other three were cropped carefully to show each part of the upper body described above independently. A total of 240 participants judged these faces for perceived age and attractiveness. Our results showed significant differences in perception with the chest and the arms being judged significantly younger than the face or composite image of the same women. Moreover, arms and chest images were perceived as more attractive than face and composite images. Finally, regression analysis indicated that differences between the perceived and chronological values of overall age perception could be predicted by age perception of the face and arms. These results continue to support the significance of facial age perception in assessment of a woman's age, but highlight that body skin also plays a role in overall age impression.

### **9.31. Sascha Schwarz & M. Hassebrauck**

Sex and age differences in mate selection preferences.

For almost 70 years several studies have shown large sex differences in human mate selection preferences. However, almost all studies were restricted to a limited set of mate choice criteria, examined primarily young college students, and did not specify or collapse across relationship statuses. In this Study, a total of 21,245 heterosexual participants between 18 und 65 years (mean age 41 years), currently not involved in a close relationship, gave importance ratings for 82 mate choice criteria adapted from previous studies on the prototype of the perfect long-term mate, reported age ranges for the oldest and the youngest partner preferred, and completed ten questions, if she / he could imagine to marry someone with certain characteristics. Women were found to be the more demanding sex in almost all mate choice criteria. Men only placed consistently more value on the physical attractiveness of a potential partner than women. Effects of participant's age as well as effects of level of education were almost neglectable. These results demonstrate the robustness of sex differences in mate choice criteria across a large age range.

### **9.32. David Smith, B. Jones, D. Feinberg & K. Allan.**

A modulatory effect of male voice pitch on long-term memory in women: evidence of adaptation for mate choice?

Human memory may be attuned to information that is of adaptive value (i.e., that promotes survival or reproductive fitness). While several recent studies have presented good evidence that memory is particularly sensitive to survival-related information, the possibility that memory may also be particularly sensitive to mate-choice-relevant information has received less attention. Consequently, we investigated whether memory in women is sensitive to men's voice pitch, a sexually dimorphic cue that is important for mate choice. We hypothesized that women's memory may be biased by the presence of cues of masculinity. Computer transformation techniques were used to raise or lower voice pitch in recordings of four male and four female speakers who spoke the names of a set of objects. These recordings were first played to a group of young adult women as they viewed images of these objects. Next, these women's memory for the objects was tested by asking them to discriminate the studied objects from similar, but unstudied, objects. Object memory was

significantly better for objects whose names were spoken by masculinized (i.e. lowered pitch) men's voices than when they were spoken by feminized (i.e. raised pitch) men's voices. No analogous effects were found when women listened to other women's voices. These data provide new evidence of a functional specialization within women's memory that could function to promote the retention of information associated with men who display cues of attractiveness, dominance and, potentially, long-term health.

### **9.33. Jelte ten Holt, P. van Lange, H. Ijzerman & D. Balliet**

The Babyface Effect, not so overgeneralized after all.

Neotenous, or babyfaced individuals, are perceived as possessing such traits as naivety, honesty, friendliness, warmth and sociability (see Zebrowitz, 2008 for a review). The baby overgeneralization perspective maintains that these perceived traits are not actually possessed by babyfaced people, but that people incorrectly attribute baby-like qualities to these people. The evolutionary reasoning is that offspring benefit more from the extra care they receive as a result of this effect than parents lose due to their mistaken perceptions of other adults. An alternative theory suggests that babyfacedness, or neoteny which is the attribute of looking more childlike than you are, is a strategy of submissiveness (Guthrie, 1970; Keatings, 2003). Neoteny signals benefit the senders, as they escape harmful dominance displays, and the receivers, as they need be less concerned about insubordination by the neotenous individual. These two theories allow for different predictions regarding social behavior. Overgeneralization suggests that babyfaced people would be trusted more and potentially given more, but their behaviour would be no different from their non-babyfaced peers. Neoteny predicts that babyfaced participants would be trusted more and given less. According to this perspective, babyfaced participants should actually behave in a more trusting manner and give more. Method: We tested these predictions over two experiments, ( $N = 90$  and  $N = 95$ ). Each participant was photographed, with the pictures then rated by independent judges, blind to condition and the purpose of the studies. In the first experiment participants rated themselves on trust items, and played a prisoner's dilemma, while in the second experiment participants played a trust game. Result: In the first experiment babyfacedness was positively correlated with self-reported trust. This effect held, even when femininity, masculinity and attractiveness were also entered into a regression. None of the other attributes approached significance. In the Prisoner's Dilemma, participants trusted babyfaced partners more and gave them less, while babyfaced participants expected to receive less. Finally, in a Trust game babyfaced participants gave more while they were in the second role, or the role of the trustee. Conclusion: These studies offer support for the neoteny theory and not for the overgeneralization theory. Babyfaced individuals are taken more advantage of and expect to be taken more advantage of. Rather than retaliate against this, however, they actually end up behaving in a more trustworthy manner. These findings suggest that another look at the babyface effect is required.

### **9.34. Sigal Tifferet, O. Gaziel & Y. Baram**

I shoulda learned to play the guitar: Guitar increases Facebook attractiveness.

Music is both ancient and universal and has genetic and brain localized features. As such, it warrants adaptive explanations. While some claim that music has no adaptive function per se, others suggest some adaptive function such as a coalition signaling system, or mother-child bonding. A popular theory suggests that it music serves as a signal in mate selection. Musical People who play musical instruments may be attractive in that they signal that (1) they have good genes enabling them to play a musical instrument, like fine motor skills or an ability to learn and (2) that they can afford investing time in learning to master an instrument. While the claim that music is used in sexual selection is prevalent and widely reviewed, it has little empirical evidence. We therefore hypothesized that a Facebook profile photo of a man holding a guitar will receive more positive responses in comparison to a Facebook profile of the same man without a guitar. In an experiment, two identical Facebook profiles were created; one showed a young man sitting down, smiling and holding a guitar, the second showed the same man sitting down, smiling, without the guitar. A friendship request was sent from each profile to 50 different young women with the accompanying text: "Hey, what's up? I like your photo." Responses were categorized into positive ("I like yours too") and negative ("I have a boyfriend" or no response). While only five women responded positively to the friendship request that was sent by the profile without a guitar, 14 responded positively to the friendship request that was sent by the profile with a guitar ( $p = .02$ , Fisher's exact test). Results support the hypothesis that men who play musical instruments are perceived as more attractive and provide initial support for the sexual selection theory of music. The results, however, do not deny the role of

music in other functions. Since the study was conducted in a non-traditional culture, the results need to be replicated in other cultures, especially traditional ones. It would be interesting to see whether musical tendencies are attractive in both males and females, as are clear skin, or facial symmetry; or that musical competence is favored especially in males.

### **9.35. Katherine Valentine, N. Li, D. Perrett & L. Penke**

Taking a man at face-value: the role of facial ratios and dominance in mate choice at speed-dating events.

We examined the relationships between facial width-to-height ratios, dominance, and attraction among men in an ecologically valid mating context: speed-dating. Men with higher facial width-to-height ratios were perceived as more dominant by independent raters and received greater interest from female speed-daters for both potential long- and short-term relationships. They were also more selective, indicating interest in seeing less speed-dating partners again after the events. In particular, such men showed lower interest in potential long-term (but not short-term) relationships. These findings indicate that men with greater facial width are more desirable not only for short-term but also long-term relationships, though such men may be more apt to enact a short-term mating strategy. More generally, the results are consistent with a good genes perspective on masculinity and highlight the role that facial features play in heterosexual attraction.

### **9.36. Marco Varella, J.H. Ferreira, L. Cosentino & V. Bussab**

Evolutionary implications of sex differences in aspects of musicality: cross-cultural sample from Brazil, Europe and Canada.

Humans have musicophilia, a natural attraction and attachment for musical activities that requires an evolutionary explanation. Evolutionary Musicology is a discipline that focuses human music origins in an evolutionary perspective both in phylogenetic terms, in a comparative framework – related with sound communication in other species -, and in adaptive terms - in respect to its surviving and reproductive values. Collectively musical cognition, propensities, behaviors satisfy a number of basic conditions that qualified a complex biological adaptation. Explanations for ancestral adaptive value of musicality focus mostly on group selection and sexual selection. Besides having many overlapping aspects, they differ about predicted sexual differences. Group selection predicts fewer unspecified sex differences, and sexual selection specifies: women would be more inclined to aspects related to musical appreciation and assessment, while men would be more oriented to musical display. In trying to push the debate to a cross-cultural empirical dimension we tested group selection and sexual selection predictions by comparing both sexes. In addition to cultural influences, this analysis can highlight clues of the evolutionary processes that shaped musical cognition. Participants were 386 women and 320 men from Brazil, Europe and Canada. They answered a self-report questionnaire about how much they: "have musical experience", "like to sing", "like to play an instrument", "appreciate music", "hear music per day", "feel music as important in their life", "like to dance" and "like the arts". The Mann-Whitney test showed that women like singing more ( $p<0,001$ ), appreciating ( $p=0,040$ ), they considered music most important in their lives ( $p=0,007$ ), like dancing more ( $p<0,001$ ) and the arts ( $p=0,005$ ). While men reported greater musical experience ( $p=0,007$ ) and like for playing ( $p<0,001$ ). This may indicate some influence of sexual selection. Cross-culturally men are more motivated to learn and display their music expertise by playing instruments while women are more motivated for music and arts appreciation and consider it more important in their lives. Interestingly women are also motivated to musical display by singing and dancing. Male and female forms of musical display and women greater appreciative aspect might have co-evolved during ancestral musical rituals and events where they could impress the opposite sex and gain respect by the same sex. Much more cross-cultural empirical data regarding adaptive explanations of human musicality and artistic propensity is needed before theories could be totally rejected.

### **9.37. Tia Walters**

Oh no she didn't: female intrasexual competition is partly mediated by characteristics that men find attractive.

Competition is the primary force for driving sexually selected adaptations in evolutionary psychology, yet women's intrasexual competition and their sexuality in general remain understudied. By examining the minimal amount of literature on the perception of sex and beauty and female competition, discussing two experiments

that are aimed at showing that females indeed utilize intrasexual competition that is based in part on phenotypic cues of high mate value that human males consistently find attractive: wait-to-hip ratio, as well as discussing a theory of female intrasexual competition that is based on what we have learned about female sexual self-perception and their use of waist-to-hip ratio, and a females desire to carefully “negotiate space” and present themselves as the best possible choice in mate selection. The suggestion is that women are not only sensitive to, but will utilize the same phenotypic cues to female attractiveness that men do and that female relational aggression is an intrasexual competitive behavior, is partly mediated by the female's own phenotypic quality and relationship status, and facultatively utilized in context where a high quality male is primed. Overall, through exploring intrasexual competition of women, it is shown that societal ideals and men's ideals appear to drive women's perception of their own sexual and physical self-image and because women understand the perception of what is attractive to potential mates, they will utilize such perceptions in intrasexually-based competitive relational aggression in competition for a desired mate. The competition intensifies as the women themselves are physically closer to the optimal waist-to-hip ratio of .7. The further from this ratio a woman is, the less likely they are using their physical appearance as a form of competition and thus another competitive element may be taking place.

### **9.38. Agnieszka Zelazniewicz, M. Babiszewska & M. Just**

Female voice characteristics and susceptibility to sexual infidelity.

Introduction Detecting the risk of partner's infidelity may help prevent potential costs like resources disruption, cuckoldry or sexual transmitted infection. In women, oestrogen is positively related to voice pitch and to the likelihood of extra-pair mating. Also, men's rating of woman's voice attractiveness is associated with her age of sexual initiation and number of sexual and extra-pair partners. Previous research showed that women with high pitched voice are perceived as more attractive and as more likely to commit infidelity. This attribution may be adaptive if allows to avoid partners who may more likely to be unfaithful. The aim of this study was to examine if women's susceptibility to infidelity, predicted by personality factors, is linked to voice characteristics related to oestrogen level and attractiveness. Methods 54 women (M age = 21,5±1,36) from the University of Wroclaw completed The Infidelity Scale (Drigotas et al., 1999), SOI-R (Penke & Asendorpf, 2008) and the Big Five Inventory (John & Srivastava, 1999). BF Inventory is a self-report measure, designed to assess personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness. Previous research showed that low levels of conscientiousness and agreeableness, and high levels of narcissism are associated with relationship infidelity across cultures. Voice samples were recorded using capacitor microphone with a preamplifier connected to PC. Participants were asked to vocalize the vowel 'a'. Acoustic analyses were made using DiagnoStat software. Voice pitch (F0), formants (F1, F2, F3, F4) and voice quality (the highest frequency where harmonic frequencies dominate over non-harmonic frequencies) were included into the analysis. Participants with health problems concerning vocal tracts (e.g. possible tubers, heavy smokers) were excluded from data. Results Statistical analysis revealed that the score on Infidelity Scale was negatively related to F0. Among the BF traits only consciousness was positively related to F0. Consciousness was also positively related to voice quality. We found no correlation between SOI-R and voice parameters. Discussion The study showed a reverse to expected relationship between susceptibility to infidelity and voice characteristics. Women with higher pitched, more attractive voices, scored lower on the Infidelity Scale and also were more conscious what is related to lower risk of infidelity. We suggest that higher risk of adultery in women with attractive voices, reported in previous studies, may be a result of greater sexual opportunities rather than personal inclination to sexually infidelity.

## **Group 10. Personality**

### **10.1. Dariusz Danel, A. Zelazniewicz, N. Nowak & A. Tomaszewska**

Can the adult romantic attachment style be a shield against the premenstrual syndrome?

The Premenstrual Syndrome (PMS) is a cluster of physical and emotional symptoms that appears before menstruation and affects with various intensities approximately 90% of women worldwide. The etiology of PMS still remains unknown. One of the evolutionary models hypothesizes that PMS is an adaptive by-product inducing positive states during ovulation which in turn maximize the chance of mating and fertilization. When ovulation ceases and no conception occurs, shift toward lower states is experienced as PMS. This implies that women in

both biological and social conditions favouring successful reproduction are expected to experience elevated positive states during ovulation and, if not fertilized, substantial distress during a late luteal phase. However, in romantic relationships, this recurrent reinforcement of adverse PMS symptoms, and woman's "rejective behavior" during PMS, may be intimidating for her partner and destructive for the couple well-being. As some personality traits are proposed to play a protective role against negative results of PMS, one can hypothesize that a similar sheltering mechanism operates also in adult romantic relationships. These possible protective practices may be related to the attachment style (AS) and especially to its "secure" pattern defined by a low level of attachment-related anxiety and avoidance. The main objective of this study was to explore a possible link between the severity of PMS and those two measures of the relationship style pattern. One-hundred-thirty regularly menstruating women (age:18-42) who did not use hormonal contraception completed two questionnaires regarding PMS (The Shortened Premenstrual Assessment Form; Allen et al. 1991) and AS (Experiences in Close Relationships Questionnaire - Revised; Fraley et al. 2000). Multiple regression model with PMS as a dependent variable and two measures of AS (i.e. attachment-related anxiety and avoidance) revealed that only anxiety was positively related to PMS intensity. However, after the sample was split into two subgroups (i.e. women currently in a relationship vs. currently single), results remained significant only for the single women who referred to the last year of their previous relationship. It was assumed that the protective role of the attachment style from PMS outcomes results in negative links between PMS severity and attachment-related anxiety and avoidance. Since our results do not confirm this hypothesis we propose that the adult attachment style does not provide protective role from PMS.

### **10.2. Marco Del Giudice**

Sex ratio dynamics: a plausible, powerful source of fluctuating selection on personality.

Fluctuating selection has been proposed as a general mechanism driving the evolution of genetic variation in human personality traits. I argue that the temporal dynamics of the sex ratio (SR) provide a powerful source of fluctuating selection on personality. The SR affects a wide range of social behaviors ultimately related to mating and parenting; changes in SR are likely to exert selective pressures on most personality traits, including the Big Five, and the correlated changes favored by SR variation are consistent with those predicted by life history theory. Crucially, the temporal dynamics of the SR are intrinsically characterized by fluctuations at different levels and different time scales. First, the ASR is subject to stochastic fluctuations, which are especially strong in small populations comprising a few hundred individuals (that is, in the conditions characterizing human evolution until the last few millennia). A simulation model can be used to accurately quantify the contribution of stochastic fluctuations. Second, OSR fluctuations of large amplitude arise following population expansion and contraction. Third, oscillatory OSR dynamics are amplified and destabilized when younger and older individuals compete with each other for mates. Fourth, changes in sex-specific mortality and dispersal can act as delayed feedback mechanisms, counteracting changes in the ASR after they take place. Finally, shifts in life history-related behavior result in delayed negative feedback on the OSR, further reinforcing the fluctuating nature of SR dynamics. Thus, SR dynamics represent a persistent source of fluctuating selection on a broad array of personality traits. The "SR hypothesis" of personality evolution is that fluctuating selection driven by SR dynamics contributes to explain the maintenance of genetic variation in human personality traits. Intriguingly, the SR hypothesis overcomes the classic evolutionary genetic challenges to fluctuating selection models, and suggests novel explanations for the lack of major-effect genes in association studies of personality.

### **10.3. Robin Kramer, J. King & R. Ward**

Identifying personality from the faces of humans and chimpanzees: evidence for a shared signalling system.

Many aspects of personality are honestly signalled on the human face. Previous research has shown accurate identification of socially-relevant information from static images of unknown faces with neutral expressions. Here, we examined the evolutionary history of this signal system. In four studies, we investigated accuracy in perceiving extraversion-related characteristics from chimpanzee (*Pan troglodytes*) faces using both forced-choice and ratings tasks. In addition, we explored whether the ability to accurately perceive human extraversion showed any relationship with performance on these tasks. We found that untrained human observers reliably discriminated characteristics related to extraversion solely from non-expressive facial images of chimpanzees. Observers were also able to accurately perceive extraversion in humans but performance on these two tasks was

not correlated. In chimpanzees, as in humans, there is information in the static, non-expressive face that signals aspects of an individual's personality. We suggest this cross-species ability to receive information is best explained by shared personality structure and signalling in the two species. However, there also appears to be a more uniquely human aspect to the system.

#### **10.4. Vera Pivonkova & A. Rubesova**

Adequacy of attributions personality characteristics based on 2D and 3D facial representation of judged individual.

**Objective:** People can to same extent adequately judge personality of others based on facial photographs. In real life setting, these judgments are made based on 3D stimuli. Therefore, we tested whether more ecologically valid stimuli (3D scans) will increase adequacy of personality judgments compared to en face photographs (2D stimuli). In our previous study we have found the connection between facial masculinity and male dominance. Given that masculine features are more visible in profile (e.g. chin prominence) we presumed higher adequacy of dominance attribution based on 3D stimuli compared to photographs. Because the development of masculine features is under influence of testosterone, we expected cross-cultural agreement in dominance judgment.

**Methods:** Facial photographs and 3D scans of 52 men and 50 women were taken and the participants filled in personality questionnaires NEO-PI-R and Cattell's 16 PF. The stimuli were then rated by 199 Czech women and 178 Czech men (on average 13 raters per characteristic) for masculinity, attractiveness and Big Five personality factors (Agreeableness, Neuroticism, Opened to experience, Extraversion, Conscientiousness) and 2 selected Cattell's factors (Dominance and Anxiety). Furthermore 17 Namibian men and 16 Namibian women rated only male stimuli for dominance. **Results:** We found positive correlations between the personality profile of the depicted person and attribution of Extraversion in case of Czech male's ratings of women's 3D stimuli. In model not separating sex of stimuli, Dominance was rated adequately based on 3D stimuli by both sexes of Czech raters. We did not find any positive relationship between photographs' ratings and personality profile of the photographed person. Namibian raters did not rate Dominance adequately. **Conclusion:** Our results show that using 3D stimuli increases adequacy of personality attribution. However, our presumption of adequacy of dominance rating in different cultural context was not confirmed.

#### **10.5. Thomas Pollet, G. Stulp & M. Stirrat**

Narrow-faced males are more likely to die from contact violence than wide-faced males.

Bizygomatic width (scaled for face height) in male faces is a testosterone-linked trait predictive of physical robustness and reactive aggression in the lab in sports. It also predicts others' attributions of predisposition to aggression and trustworthiness. In student samples, bizygomatic width ratio is a reliable predictor of self-reported ability to win fights. This ratio was also shown to be related to the frequency of actual physical violence in a hunter-gatherer sample. Given these associations we tested whether bizygomatic width (scaled for upper face height) was systematically related to cause of death, in a forensic sample covering 523 male skeletons (<http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/02581/detail>). We hypothesized that wider faced males, being more robust, would be less likely to die from physical violence, particularly contact violence (being beaten to death, stabbed, strangled or bludgeoned to death). Cox proportional hazard models showed that men with lower bizygomatic width (i.e. narrower faces) were significantly more likely to have died as a consequence of homicides involving direct physical contact, than men with high bizygomatic width (i.e. wider faces). This effect was found regardless of taking into account all causes of mortality (including for example natural deaths and accidents, Hazard ratio= 1.77 (for each SD); Wald= 7.78; p= 0.005) or limiting the sample to homicides (Hazard ratio= 1.65 (for each SD); Wald= 5.25; p=0.017). Controlling for ethnicity did not alter these results. This finding suggests that wider faced males are less likely to die from male-male aggression, perhaps because of their increased physical robustness. Our findings are discussed with reference to the previous literature indicating that bizygomatic width is a marker for male dominance.

#### **10.6. Michele C. Quist, C.D. Watkins, F.G. Smith, L.M. DeBruine, & B.C. Jones.**

Facial masculinity is a cue to women's dominance.

Although there is compelling evidence for associations between facial masculinity and indices of dominance in men, comparatively few studies have tested for corresponding associations in women. Here we found that (1) ratings of women's facial masculinity were correlated with their scores on a dominance questionnaire, and (2)

prototypes with the average facial characteristics of women with high scores on the dominance questionnaire were judged to be more masculine than prototypes with the average facial characteristics of women with low scores, even when color and texture cues were kept constant to control for effects of makeup use. These findings suggest an association between facial masculinity and dominance in women, complementing prior work reporting that masculine women are perceived to be more dominant than their relatively feminine peers.

### **10.7. Gillian Ragsdale & R. Foley**

#### **Parent-of-origin effects on empathy.**

Genomic imprinting is a violation of Mendel's laws that enables selection to act on genes depending on parent-of-origin. This study tested whether there are parent-of-origin effects on the heritability of empathy in the general population as part of a larger question concerning the role of imprinted genes in the evolution of human cognition and behaviour. The measure tested was the Empathy Quotient, which was developed by The Autism Research Centre for use with both general and clinical population samples.

To test genomic imprinting hypotheses correlations in EQ scores between pairs of full, maternal and paternal siblings were compared using path analysis. Where scores are influenced by imprinted genes, the actual correlations between pairs of siblings will differ from those expected following classical Mendelian inheritance in a predictable way depending on what kind of imprinting is influencing the trait and the fit of Mendelian and imprinting models can be compared. The results of this study support a model of competing maternal and paternal influences on strong and weak empathy.

### **10.8. Julia Robertson & T. Hussey**

#### **Measuring sociosexuality - empirical support for the revised Sociosexual Orientation Inventory.**

The study of sociosexuality (or the individual differences in people's readiness to engage in uncommitted sexual relationships), has long been one of key interest to evolutionary psychologists, though its unidimensionality as a construct, and as a consequence its measurement has, more recently, been questioned. As the leading measure of sociosexuality, the Sociosexual Orientation Inventory (SOI) has been enormously successful in providing an instrument that measures broad aspects of sociosexuality, satisfying, as it does, the original remit set by Simpson, J. and Gangestad, S. (1991) when devising the instrument. However, as the focus has shifted towards a conceptualisation of human mating strategies as contextual and pluralistic, with both men and women engaging in long and short-term mating tactics dependent upon the context, the ability of the SOI to portray the pluralistic nature of human mating strategies has been questioned. Consequently, Penke, L. and Asendorpf, J. (2008) have produced a revised Sociosexual Orientation Inventory (SOI-R), established to allow both multi-dimensional analysis across 3 theoretically meaningful constructs, sociosexual desire, attitude and behavior, as well as the more traditional unidimensional analysis.. Here, the SOI-R was investigated to confirm internal reliability and suitability for analysis across the three factors (desire, attitude and behavior). 229 undergraduates completed the scale, 138 women ( $M$  age = 30.58,  $S.D.$  = 11.47) and 86 men ( $M$  age = 27.85,  $S.D.$  = 12.19). Principal Components Analysis revealed all variables loading substantially (all exceeding .75) across the three components, indicating the suitability of a 3 factor analysis. Cronbach's Alpha revealed high internal reliability, with all three sub factors achieving  $\alpha \geq .78$ . In order to investigate the discriminative capability of the SOI-R, 2 objective predictor variables (height and 2D:4D digit ratio) were also computed for the male participants in relation to the 3 sub factors of sociosexuality. Correlational analyses of both male height and 2D:4D digit ratio indicated a significant difference between sociosexual desire and sociosexual behavior when correlated with male height ( $z_{obs} = -2.28$ ), and a significant difference between sociosexual desire and sociosexual behavior when correlated with 2D:4D ( $z_{obs} = -2.96$ ). As such, this study provides empirical support for the 3-factor SOI-R, offering the opportunity for a more differentiated and thus more detailed approach to our future understanding of sociosexuality.

### **10.9. Rahael Ross & M. Lyons**

#### **The Dark Triad and childhood experiences.**

According to Life History Theory, exploitative and hostile inter-personal orientation could be an adaptive consequence of harsh socio-ecological conditions in early childhood. Previous studies have found that Psychopathy and Machiavellianism relate to fast life history strategy, characterised by diminished parenting, and increased mating effort (e.g. Jonason et al, 2009). The present study explores the relationship between suboptimal parenting practices experienced as a child, and the Dark Triad (Narcissism, Machiavellianism and

Psychopathy ) personality traits. We expect that harsh parenting practises contribute to the development of Machiavellian and Psychopathic (but not Narcissistic) personality characteristics. Measures of the Dark Triad traits and recollections of parental warmth and control were completed on-line by 107 individuals (30 males). In correlational and regression analyses, Machiavellianism, Psychopathy and composite Dark Triad were predicted by recollections of uncaring mothers and fathers. Furthermore, cold and uncaring parents predicted scores on the Psychopathy subscales of Callous Affect and Erratic Lifestyle. Uncaring fathers (but not mothers) predicted scores on the Criminal Tendencies subscale. The results of our pilot study suggest that some aspects of seemingly undesirable personality traits could be an adaptive response, triggered by early childhood experiences. The findings are discussed with a reference to Life History Theory and development and adaptiveness of Machiavellianism and Psychopathy.

#### **10.10. Scott Semenyna & L. Honey**

It's not just a guy thing: Female dominance and the Dark Triad.

Lately the Dark Triad (DT) has gained a growing literature surrounding its origins, development and expression in a social species like humans. The cluster of personality variables constituting the DT – subclinical psychopathy, subclinical narcissism, and Machiavellianism – are readily attributed to men, but investigation into how these manifest in women demands more in depth appraisal. The present study compared women's scores on the California Psychological Inventory (CPI) dominance subscale and the Rank Styles with Peers Questionnaire (RSPQ) with scores on the Concise Measure of the Dark Triad. CPI scores were not found to correlate with the Dark Triad, but the more sensitive RSPQ (predominantly the subset of Ruthless Self Advancement) predicts DT scores. The Coalition Building subset of the RSPQ was inversely correlated with scores on the DT. These results suggest that Dark Triad traits are associated with some, but certainly not all, measures of social dominance in women.

#### **10.11. Siri Taxbro & M. Lyons**

Evolutionary perspectives on the development of empathy and social intelligence: the role of parenting practises.

According to evolutionary perspectives on human development, highly investing parents provide a platform for secure attachment, resulting in more pro-social and empathetic inter-personal orientations in adulthood (Belsky, Steinberg & Draper, 1991). Some of the phenotypic variation in empathy and perspective taking could be a result of childhood bonds with parents (Davis, Luce & Kraus, 1994; Hughes et al, 2005), adverse parenting leading to less empathetic and more misogynist social styles. Here, findings of two studies investigating the relationships between recollections of parenting practices, and multiple measures of empathy and Theory of Mind (ToM), are reported. Study 1 participants (N=46) filled in the Parental Bonding Instrument (PBI) (Parker, Tupling & Brown, 1979) measuring recalled parental warmth and control. Participants also completed Baron-Cohen et al's (2001) Eyes test as a measurement for ToM capacity. None of the four parental practices (mother and father control and mother and father care) were correlated with the Eyes test, indicating that at least in this sample, ToM was not related to parenting styles. Study 2 was an on-line questionnaire study, completed by 64 volunteers. Inter-Personal Reactivity Index (IRI) (Davis, 1983) and Empathy Quotient (EQ) (Baron-Cohen & Wheelwright, 2004) were used as measures for empathy, and the PBI was used as the measure for parenting practices. The IRI subscale of Perspective Taking was significantly, negatively correlated with controlling and over-protective parents. Empathy Quotient was significantly, negatively correlated with over-protective, controlling parents, and positively correlated with having a warm and caring mother. The findings of these studies indicate that having controlling, restrictive and authoritarian parents and a cold, detached mother can dampen the development of perspective taking (at least in a self-reported study) and capacity for empathy. It is possible that harsh parenting prepares children for environmental adversity, and that lack of empathy could be adaptive in these circumstances. The results are discussed with a reference to Life History Theory and development of empathy.

#### **10.12. Kataline Trudel & N. Pound**

Feared or revered? Assessments of formidability and leadership quality from men's faces.

Evolutionary psychologists have suggested that assessments of traits, such as dominance, derived from faces may play a role in intrasexual competitive evaluations and in mate choice. For example, Sell et al. (2009) reported that men are able to assess the physical strength of others from facial appearance alone and that assessments of a man's formidability as a potential opponent in a physical fight are highly correlated with these strength ratings.

While being perceived as physically formidable may facilitate the acquisition of social status, it may also be freely conferred based on qualities other than the use or threat of force (Henrich & Gil-White, 2001). Consequently, in the present study we sought to investigate the associations between apparent strength, formidability and a trait that may elicit deference without force: perceived leadership quality. Moreover, since a formidable appearance may elicit socially undesirably personality attributions we examined its effects on attractiveness to females (who may need to make a trade-off between preferring strong looking men, and avoiding those who seem more prone to display aggressive behaviour). Using independent samples of raters, we found that for men's faces formidability ratings were highly, but not perfectly, correlated with strength ratings – and that the residual variance was negatively associated with both attributions of leadership quality and attractiveness to women. These findings suggest that there is no single dimension of facial appearance that is associated with success in different domains.

**10.13. Bettina Weege, B. Fink, J. Flügge, S. Röder, N. Neave & K. McCarty**

Men's personality and women's perception of their dance quality.

Recent research shows that women judge males who show variability in their body movements as good dancers. Although preliminary evidence on associations of dancing ability with measures of physical strength, prenatal androgenisation and body symmetry exist, empirical **studies** on the relationship of personality and dance quality remains scarce. Here we report data on women's perception of dance quality in 48 men, aged 18 to 42 years, and relate them to men's self-reported personality traits. Male participants completed a standardized personality inventory (the NEO-FFI) and then danced to a basic rhythm while their body movements were tracked with optical 3D motion-capture technology. Dance movements were applied to a featureless virtual humanoid character and judged on their dance quality by 53 women, aged 17 to 57 years, who viewed 15 seconds of the rendered video clips of each male dancer. 'Good' dancers scored significantly higher on extraversion, conscientiousness and agreeableness, but significantly lower on neuroticism compared to 'bad' dancers. No significant difference was observed with openness. We suggest that male dance movements may convey aspects of their personality, though possible consequences in terms of female mate preferences and selection remain to be explored.

**To:** Researchers working in evolution and the social sciences  
**What:** Submit your proposal for a meeting or working group

Proposals are now being accepted for meetings and working groups that explore the intersection of the evolutionary and social sciences at the US National Evolutionary Synthesis Center (NESCent).

We welcome proposals that seek to understand the value of evolutionary thinking in a particular social science, or conversely, how social science can inform evolutionary studies of human (and perhaps, other species') biology. In particular, proposals that are significantly interdisciplinary, and that demonstrate international participation and a mix of senior and emerging researchers, including graduate students, are encouraged. Minority participation is also an important consideration in evaluation.

NESCent invites researchers to submit proposals for two kinds of meetings — Catalysis Meetings and Working Groups. To learn more about these meetings and the proposal process, please visit [www.nescent.org/science/proposals.php](http://www.nescent.org/science/proposals.php).

**Eligibility:** Researchers of all nationalities are welcome to apply.

**Deadline:** September 1, 2011 or January 1, 2012

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A l'attention des chercheurs travaillant  
dans le domaine de l'évolution et des sciences sociales

**Sujet:** Appel d'offres pour des demandes de subvention pour une manifestation scientifique (séminaires et groupes de travail)

**Eligibilité:** chercheurs de toute nationalité

**Date limite:** 1er Septembre 2011 ou 1er Janvier 2012

Des demandes de financements pour des séminaires ou groupes de travail explorant l'interface entre des sciences de l'évolution et des sciences sociales sont maintenant acceptées par le Centre National Américain de Synthèse Evolutive (The US National Evolutionary Synthesis Center; NESCent).

Cet appel d'offres concerne des projets cherchant soit à appréhender la signification de la pensée évolutionniste dans les sciences sociales, soit, inversement, à comprendre comment les sciences sociales peuvent éclairer les études sur l'évolution de l'homme (et d'autres animaux). L'appel d'offre cible des projets clairement interdisciplinaires, avec une participation internationale. La participation de jeunes chercheurs au début de leur carrière ainsi que celle d'étudiants des cycles supérieurs, sont encouragées.

NESCent invite les chercheurs à soumettre leur candidature pour deux types de séminaires – des « réunions catalytiques » et des réunions de groupes de travail. Pour plus d'information visitez le site web de NESCent <http://www.nescent.org/science/proposals.php>



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