

# THE EVOLUTION OF HUMAN AGGRESSION: LESSONS FOR TODAY'S CONFLICTS

## Poster Abstracts

### **Puberty, Testosterone, and Aggression among Zimbabwe Schoolboys**

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Aggressive behavior among teenage boys is popularly associated with the dramatic increases in circulating testosterone at puberty. Yet the existing evidence suggests that testosterone is not directly related to aggression at puberty, and furthermore, its effects on anti-social behavior depend on social context. However, most of the research on testosterone and aggression at puberty has been conducted in the U.S. leaving the impact of the larger cultural setting unclear. Thus to explore the relationship between testosterone and aggression in a nonwestern culture we examined the relationship between testosterone and aggression among school boys in Zimbabwe where cultural attitudes about physical aggression are more permissive than in the U.S. Using a cross-sectional design, we found while salivary testosterone increased from age 12 to 18 years aggression as measured by the Olweus aggression index did not. Nor was there a discernable relationship between salivary testosterone and the Olweus subscales. On the other hand, measures of aggression were related to frustration tolerance. These results are consistent with earlier findings in suggesting that the expression of aggression among boys at puberty is not a function of increasing testosterone levels, but appears to reflect individual variation in the development of behavioral inhibition.

### **Male-Male Competition's Influence on Primate Brain Size**

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Primates have evolved large brains. Male primates also fight against other males with great intensity to secure access to females and resources. We hypothesized that male-male competition has helped drive the enlargement of the primate brain because competition demands extensive strategic and physical interactions between opponents. Both the strategic and physical aspects of competition should drive brain size increases more in species that fight with greater intensity compared to species that fight with less intensity. To address this prediction, we examined the correlation between brain size and body size dimorphism, a reliable indicator of male-male competition intensity, within primates. Dimorphism is how much larger a male is than a female of a given species. Body size dimorphism was positively correlated with brain size. Further analysis of body size dimorphism was done by breaking the order into the sub-groups. Results were not consistent, but contained significant positive correlations between brain size and competition. In conclusion, brain size is weakly positively correlated with male-male competition (measured using body

size dimorphism) overall, but this correlation is highly variable within specific sub-groups. This correlation is suggestive that competition has partially influenced the increased brain size found within primates.

### **Costs and benefits of an ADHD associated gene in settled and nomadic pastoralists of Kenya**

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The dopamine receptor D4 ( DRD4 ) gene has been correlated with many traits including ADHD and aggression. The 7R (ADHD associated) allele was found to be at a higher frequency in nomadic compared to sedentary human populations and at a higher frequency in populations with a history of migration. It has been argued that the 7R allele may be associated with population variation in aggression. We previously showed that the 7R allele was associated with indices of nourishment among male Ariaal pastoralists of northern Kenya. Among a nomadic subset of the population, the 7R allele were not as undernourished compared to those without the 7R allele. Among Ariaal men who had recently settled, the opposite association was seen. Here we extend these previous findings to the association of the 7R allele with reproductive success and reproductive function among Ariaal men. Specifically we looked at the association of the 7R allele and the number of wives and children, and self-reported sexual satisfaction and erectile function. We discuss the implications of these findings for the role of DRD4 in aggression informed by ethnographic accounts of Ariaal and closely related pastoralist groups.

### **David, Bathsheba, and Literary Darwinism: Biblical Sex and Violence as Adaptation**

Eric A. Eliason, Brigham Young University.

The discoveries of evolutionary psychology find dramatic resonance in the Bible story of David and Bathsheba's adultery and the murder of Bathsheba's husband Uriah. Virtually every detail of this episode underscores empirically observed human reproductive strategies and proclivities toward violence. In fact, the David cycle is a showcase of evolutionary psychology's last 30 years of scientific findings. One might say, in a sense, *the Bible proves evolution is true*. My poster provides specific examples of this contention from the Biblical text and evolutionary scholarship. My approach is an example of Literary Darwinism—a new method of literary criticism that seeks to understand the actions of literary figures, human aesthetic preferences, and the prevalence of certain literary themes across cultures in the light of the biological sciences. If evolutionary psychology reveals universal traits of men and women across cultures and time, the enduring and revered literature of the world (having itself been subject to

selective pressures) should tell stories of people behaving in ways that evolutionary psychology predicts.

### **Demographic aggression: Do populations with high operational sex and young-old ratios produce more suicide terrorists?**

Kyle Gibson, M.A., Department of Anthropology – University of Utah

Human males, like other male mammals, compete for social, physical, and reproductive resources. This competition means males, especially young ones, are more prone than the population at large to engage in risky behavior. For example, they are more likely than other groups to die in car accidents or as the result of violence. In fact, risk taking by young males is so widespread it has been called “young male syndrome.” Here, I suggest suicide terrorism is an extreme case of risky behavior driven by high competition between males. How does one measure male-male competition? One way is with a demographic measure called the “young-old ratio.” This is the number of men aged 15-29 in a population divided by the number of men over 30 in the same population. Higher young-old ratios indicate a relatively higher number of young men in a population and thus increased competition. A significant, positive, relationship exists between young-old ratio and both the severity and duration of conflicts. This poster summarizes early findings on the relationship between young-old ratio and the number of suicide terrorists a population produces.

### **Does the Net Primary Production Predict Rates of Warfare in Foraging Societies?**

Luke Glowacki, Clarissa Scholes. Harvard University

The Net Primary Production (NPP) of a habitat may be one indicator of the productivity and distribution of food resources within that habitat. This may serve as a proxy for fission-fusion rates of primate species that subsist on those resources. This study is concerned with whether the NPP can serve to predict rates of warfare among foraging societies. If rates of warfare among foragers are a result of fission-fusion grouping and NPP is associated with fission-fusion, then we should see a correlation between levels of NPP and rates of intergroup aggression. We hypothesize that there will be little correlation between NPP values and rates of intergroup aggression or rates of death by aggression where such data is available. This is because in human communities intergroup aggression is frequently associated with proximate rewards thus decoupling aggression from opportunities to exploit power imbalances resulting from fission-fusion grouping.

## **Proximate Rewards for Lethal Intercommunity Coalitionary Violence in Humans**

Luke Glowacki, Clarissa Scholes. Harvard University

Wrangham's imbalance of power hypothesis locates the evolutionary origins of lethal coalitionary aggression among chimpanzees in a psychology that is sensitive to local power imbalances resulting from fission-fusion grouping. Exploitation of such imbalances may result in increased territory size, reduced feeding competition, and increased future reproductive success. Some human foragers also live in fission-fusion groups and display similar patterns of lethal intercommunity raiding and imbalances of power have been hypothesized to account for these. Among humans, however, there may also exist in-group proximate rewards that accompany lethal aggression. These may serve to decouple human lethal coalitionary violence from fission-fusion grouping and between group power imbalances. As a result, coalitionary aggression in humans may be less about exploiting power asymmetries and more about status seeking and signaling by males. This study examines the relationship between the relative risks of intergroup aggression and proximate motivations that derive from intracommunity rewards. We hypothesize a positive correlation between the proximate benefits resulting from intergroup aggression and the relative risks associated with intercommunity aggression. This is important in understanding the role that male-male competition, status seeking, and signaling may play in explaining patterns of human violence and in accounting for differences in coalitionary violence seen between humans and chimpanzees.

## **Morality as a Social Tool: Knowing Right from Wrong Positively Predicts Aggression and Social Dominance in Early Childhood**

Patricia H. Hawley, University of Kansas

Moral functioning and emotion skills are generally believed to indicate peak positive social functioning. Evolutionary approaches (e.g., Resource Control Theory: RCT), however, challenge conventional ways of thinking about the roles played by these skills. Hawley (2003) proposed that moral cognitive skills could be positively associated with measures of aggression in so far as both can serve personal goal attainment (social dominance). Supporting this claim, highly dominant 'bistrategic' resource controllers (those balancing prosociality and coercion) were high on both aggression and moral attunement. Results were interpreted to suggest that behaviors associated with the moral system can be adeptly used for status attainment. The present study is a follow up. Participants included 153 preschoolers. Children's moral cognitive functioning was assessed via interview, and teachers reported on moral functioning via questionnaire (Conscience; 21 items). Teachers also described children's aggression and social dominance (i.e. resource control). RCT predicts social dominance and aggression to be predicted *positively* by various aspects of moral functioning and that aggressive socially dominant individuals win positive attention. Hypotheses were largely supported. First, an exploratory factor analysis of the conscience questionnaire revealed 3 factors; Regulated Conscience (rule internalization,

guilt), Social Responsibility (behavioral reparations), and Moral Atmosphere Maintenance (MAM: concern with others transgressions). MAM was positively associated with both aggression and moral cognition. Second, both social dominance and aggression were positively predicted by moral cognition, regulated conscience, and MAM. Finally, the aggressive/dominant bistrategic controllers were among the highest on moral cognition and positive peer regard. They were among the lowest, however, on Regulated Conscience. Results support the view that morality and associated skills, while 'prosocial', need not be altruistic; these skills can be used to further personal goals. Moreover, aggression when paired with prosociality attracts positive attention from the group. Implications for behavioral interventions for aggression in schools will be discussed.

### **Aggression and anger among the Aka hunter-gatherers**

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Evolutionary theories of aggression assert that males more frequently employ physical forms of aggression (e.g., hitting), while females make use of indirect aggression (e.g., gossiping). The underlying assumption is that competition for mates necessitates men's physical confrontation, whereas women cannot endure the risks to themselves and their children of such aggression. As a result, female competition is less intense, and involves non-physical means, such as gossip. This study examines these hypotheses among the Aka hunter-gatherers, egalitarian foragers situated in the western Congo Basin forest of the Central African Republic. Ninety-eight Aka, aged 7-45 were interviewed. Levels of physical and indirect aggression, anger, and social norms on aggression were examined using peer ratings and self-report methods. Results showed that norms against hitting were strong for both men and women, while gossip was more intermediate. The expected male-bias in hitting was found for children and adolescents, but no sex-bias in gossiping was found. Contrary to expectations, no sex-bias emerged in adult peer-ratings of hitting or gossiping. Controlling for anger, a female bias did emerge in gossiping, but there was no sex-bias in hitting. Our results provide mixed support for evolutionary models of sex-based aggression strategies.

### **Informational warfare**

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Evolutionary theories of human coalitional aggression focus almost exclusively on men, proposing that male cooperation improves the likelihood of success in physical aggression. Evolutionary theories of women's cooperative behavior, in contrast, emphasize nurturing and childcare: women cooperate for mutual social support with goals that are ultimately benign to others. Among non-human primates, however, females, including mothers, often cooperate in physical

contests with other females over access to resources. We have proposed an account of human female coalitional aggression that emphasizes 'gossip,' i.e., the cooperative collection, analysis, and dissemination of reputation-relevant information, as a strategy to manipulate the social environment to the benefit of the cooperators. Such cooperative gossiping and 'detective-work' can increase coalition members' access to contested material and social resources. We report the results of an experiment, involving a large cross-national population, that investigated the influence of coalition partners on gossiping behavior. We found that coalitions serve an offensive function – increasing the perceived likelihood that adversaries will suffer reputational harm – as well as a defensive function – decreasing the likelihood that opponents will transmit negative gossip. These results support the view that both women and men engage in coalitional aggression.

### **The Ontogeny of Territorial Behavior in Chimpanzees: Implications for Hominin Territoriality**

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Territoriality is common among mammals (Mitani & Rodman, 1979) and has been defined as, "...an area of more or less fixed boundaries from which the individual or individuals in possession exclude all rival conspecifics, or at least attempt to do so, by means of territorial advertisement (vocalizations, chemical signals), threat, and, if necessary, territorial fighting." (Immelmann & Beer, 1989). Chimpanzees have been characterized as territorial and males cooperate to defend community ranges from outsiders (Goodall, 1986; Watts & Mitani, 2001; Wrangham, 1999). By maintaining territorial boundaries, male chimpanzees provide areas where they and the females they mate with can forage without the threat of harassment or attack from extra-group males. Despite our understanding of the functional aspects of territoriality in chimpanzees, we still know very little about the development of territorial behaviors in chimpanzees. I present data on territorial behaviors in young male chimpanzees at Ngogo, Kibale National Park, Uganda that address this deficiency. The Ngogo community is unusually large, with over twenty-five adult and fifteen adolescent males, and males patrol frequently (Watts & Mitani, 2001). My analyses show that young male chimpanzees participate in territorial behaviors, such as boundary patrols, intercommunity encounters (ICEs), raids and battles differentially as they age. Both intra- and inter-individual comparisons indicate that as males age they take part in more patrols, ICEs, raids and battles. Conversely, younger males are more likely to disrupt patrols and raids than are older males. These results indicate that as they mature male chimpanzees learn the skills necessary to effectively defend territorial ranges. Similar patterns are seen in human populations and the presence of this tradition in both species indicates that Hominins probably used similar mechanisms to establish and maintain territories and the behaviors associated with them.

## **Contact Aggression in Social Intrusion Situations and the Serotonin Transporter Gene (*rh5-HTTLPR*) in Rhesus Macaques: A Genotype by Genotype Interaction**

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The serotonin transporter gene (5-HTT), found in human and nonhuman primates, occurs in a long (LL) and a short (Ls) variant. The gene is associated with a variety of behaviors and personality traits, with the Ls variant associated with impulsivity and aggression. This study investigated the effect of the variants on aggression in social intrusion situations. Rhesus monkeys in groups of three had an intruder monkey, in a separate carrying case, placed at the periphery of their enclosure. We found that (a) Males with the Ls allele engaged the intruder in significantly more contact aggression than monkeys of any other sex-genotype combination. (b) The highest rates of aggression occurred when Ls allele male subjects were paired with an Ls allele intruder. This study provides preliminary evidence of a genotype by genotype interaction increasing the risk for contact aggression. The study also shows how the environment of evolutionary adaptedness influences the manifestation of contact aggression between the sexes. A complete understanding of aggression will require knowledge of how our evolutionary past affects present behavior, and future research should be sensitive not only to the context in which the aggression occurs, but to the interaction of the genotypes of the participants.

## **Patterns of dyadic conflict with respect to kinship, cooperative networks, and social status in a small-scale human society**

Chris von Rueden and Paul L. Hooper. Department of Anthropology, University of California Santa Barbara and Department of Anthropology, University of New Mexico

Conflict in small-scale human societies is not restricted to warfare or inter-coalitional competition, but may also occur between close kin or cooperative partners. Among the Tsimane' forager-horticulturalists of Bolivia, we explore the likelihood of dyadic conflict among co-resident adult men based on their kinship, history of cooperation, and social status differentials. Reported sources of conflict include sexual jealousy, spousal abuse, alleged theft, land disputes, disputes over forest product sales, and community work. Disputes among consanguineal kin (related by birth) and affinal kin (related by marriage) account for approximately 30% and 20% of dyadic conflicts, respectively. Individuals who cooperate on a regular basis are in conflict five times more than expected from random assortment of potential conflict partners, even after controlling for residential proximity. A man's social status does not predict the number of conflicts he reports. We find, however, that conflicts with higher status men are reported more frequently than conflicts with lower status men. Our results

suggest that dyadic conflict among the Tsimane' is not limited to men occupying adjacent positions in the social hierarchy.

### **Aggressive competition reveals fructose induced performance declines in a mammalian system**

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Aggressive encounters reveal differences in the health of competitors. Therefore, negative consequences of treatments that are often invisible to classical laboratory tests can be revealed through competition between exposed and control animals. The house mouse is an example of an aggressive mammal whose complex social ecology is capable of revealing dramatic but otherwise cryptic differentials in health. Here I highlight the results of three nutritional treatments and their impact on mouse competitive ability. High fructose corn syrup (HFCS) is currently the most common sweetener in the USA and its potential negative effects on health have become controversial. To experimentally evaluate impacts of HFCS on health, mice raised on diets composed of 25% HFCS were competed in seminatural populations against mice raised on either 25% sucrose or starch. Within populations mice compete for resources, territories and mates. Female mice raised on HFCS experienced increased mortality within the seminatural enclosures compared to females raised on either sucrose or starch. Additionally, males raised on starch out competed males raised on HFCS diets in territorial acquisition. This study provides experimental data that HFCS and sucrose have differential health consequences; a result that has been missed using laboratory tests but is revealed here through competition.

### **Adults and 12-month-olds show different responses to threatening ingroup versus outgroup faces.**

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Recent studies suggest that there is an interaction between how people respond to members of different racial groups and how they respond to threats of violence. The current study seeks to further understand this phenomenon by examining infants' and adults' responses to pictures of threatening faces from different racial groups. Participants were shown faces from their own and another racial group with an angry facial expression. In some cases the angry expression appeared to be directed at the participants (the face was gazing at the participants) while in other cases the expression seemed to be directed elsewhere (the face's gaze was averted). We used ERP technology, in which electrodes

placed on the scalp record brain activity, to assess participants' responses. Adults and infants showed increased activity for the outgroup faces in regions of the brain known to process facial features. Further, infants increased attention to the ingroup averted gaze face in the regions known to process social information. This may reflect infants' perception of ingroup individuals as being more reliable sources for social information. This increased understanding of when and how individuals associate racial outgroups with a threat may be useful in developing methods for reducing racial bias.

### **Domestic violence among Tsimane' Forager-Horticulturalists of lowland Bolivia**

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Spousal violence is the most common form of family violence (Levinson 1989). A recent cross-cultural study by the World Health Organization reported a lifetime prevalence of domestic violence against women ranging from 13 – 61% and an annual prevalence varying between 3 – 29% (Garcia-Moreno et al. 2006). Spousal violence raises public health and human rights concerns worldwide, yet few detailed studies of spousal conflict in small-scale, non-industrialized societies exist. Our paper incorporates cultural and evolutionary approaches to the study of domestic violence in a relatively egalitarian, kin-based society of Bolivian forager-farmers undergoing rapid acculturation. Quantitative studies of spousal abuse are biased toward samples from industrialized settings where most violence occurs behind closed doors. While epidemiologists and social scientists have stressed the importance of collecting systematic information on spousal violence in non-Western countries (Dobash et al. 1992; Erchak 1984; Heise et al. 1994; Koenig et al. 2003), no study to our knowledge has examined violence against women in subsistence-level societies with limited residential privacy and few individual differences in socioeconomic status and education. We present a path model that embeds factors common to cultural and evolutionary approaches in predicting the frequency of violence within marriages, and we hope that our framework helps direct future investigations. Among many subsistence-level populations like the Tsimane', access to and reliance on market goods is increasing and women rarely earn wages. Money represents a scarce yet fungible resource that is seldom saved and can easily be squandered by men for personal rather than familial consumption, thus creating rife potential for spousal conflict and violence. Given the extensive focus on the effects of patriarchy and men's sexual jealousy on wife abuse, it is unclear how or to what extent women's marital dissatisfaction stemming from men's withdrawal of parental investment motivates men's desires to suppress women's complaints through violence.

## **Socioecology of chimpanzee territorial behavior in Gombe National Park, Tanzania.**

Michael L. Wilson. Departments of Anthropology and Ecology, Evolution & Behavior, University of Minnesota

Since the 1970s, Jane Goodall's first reports of violence between chimpanzee groups have inspired much speculation about the origins of human warfare. In recent years, researchers studying chimpanzees at sites across Africa have found that such intergroup hostility is not limited to Goodall's study site (Gombe National Park, Tanzania) but is indeed a widespread trait of chimpanzees. What remains unclear is why intergroup violence occurs more frequently at some times and places than others. In order to gain a better understanding of the causes of intergroup violence in chimpanzees, I am analyzing data from more than 30 years of research at Gombe (1976-2007). Here I report the first findings from this study, including the patterns of border patrols, intergroup encounters, and attacks.

## **Violent Death in Northern Siberia: Application of Evolutionary Hypotheses**

John P. Ziker, Anthropology, Boise State University

Ust-Avam is an indigenous community of 500 individuals north of the Arctic Circle on the Taimyr Peninsula in Siberia (Russia). The collapse of the USSR in the 1990's significantly altered economic organization in Taimyr. In Ust-Avam the majority of working-aged adults were laid off their jobs in 1993. From 1993 to 1997, I documented decreased fertility rates and increased frequency of deaths due to unnatural (often violent) causes compared with the previous six years, when state-organized hunting was profitable (Ziker 2002). Since 2002, fertility rates have increased, but mortality rates have remained steady and unnatural deaths continue to account for up to 70 percent of all deaths. Native community members across Siberia pointed to uncontrolled sales of alcohol in the 1990s and binge drinking surrounding payday for many of the deaths. Homicides accounted for 10 percent of violent deaths between 1986 and 1997, while drowning and suicide accounted for more than half. The poster will examine homicide and other violence in Ust'-Avam in light of hypotheses derived from evolutionary theory and current cross-cultural research. In particular, male sexual proprietariness and violence will be considered in light of variables representing women's attractiveness to rivals, costs to husbands in using violence, intensity of intrasexual competition, and female choice (Wilson and Daly 1993). Interethnic homicides, homicides committed by females and children, and suicides also will be explored considering applicable variables.

## **Cultural Difference and Warfare: A Formal Model**

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How do cultural differences influence the decision to go to war? Political scientists have long analyzed countries' decisions to go to war in terms of economic and political costs and benefits. However, even though culture is

considered an important factor in these decisions, its role has not been adequately addressed by these mathematical models. Many scholars view culture as an inherently vague concept that defies quantification. However, mathematical models of cultural evolution from anthropology and evolutionary game theory provide new insights into how cultural similarities and differences at the individual level influence the likelihood of between-group cooperation and conflict. I show, with a simple mathematical model, that cultural differences between groups should increase the likelihood of state-level conflict.