

# Human Ethology Bulletin

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## Contents

<i>Human Ethology Bulletin</i> EDITORIAL BOARD and EDITORIAL STAFF	2
<i>Human Ethology Bulletin</i> INSTRUCTIONS TO AUTHORS	3
2011 Summer Institute In Human Ethology by Tom Alley	5
OBITUARY for HIRAM CATON by Wulf Schiefenhövel	6
<u>THEORETICAL ARTICLES</u>	8
<i>Understanding Sex Differences in Human Mortality Rates through Tinbergen's Four Questions</i> by Daniel J. Kruger and Carey J. Fitzgerald	
<u>TARGET ARTICLES</u>	25
<i>Hue and Luminosity of Human Skin: A Visual Cue for Gender Recognition and Other Mental Tasks</i> by Peter Frost	
<u>OPEN PEER COMMENTARIES ON TARGET ARTICLES</u>	34
<i>Commentary on Steklis &amp; Steklis (2011)</i> by Frank Salter	
<i>Call for OPEN PEER COMMENTARIES ON TARGET ARTICLES</i> by Aurelio José Figueredo	
<u>BOOK REVIEWS</u>	36
Daniel J. Povinelli reviews <i>Beyond the Brain: How the Body Shapes the Mind</i> by Louise Barrett	
NEW BOOKS AND NEW EDITIONS by Iris Holzleitner	40
CURRENT LITERATURE by Johan van der Dennen	42
2011 ISHE ELECTION RESULTS by Tom Alley	45
BACK ISSUES and ADDRESS CHANGES by Astrid Jütte	45
UPCOMING CONFERENCES by Iris Holzleitner	46
MEMBERSHIP and SUBSCRIPTIONS	47



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## ***Human Ethology Bulletin:* Instructions to Authors**

### **Bulletin Policies**

The *Human Ethology Bulletin* has recently transformed into an online peer-reviewed journal, which will publish empirical, theoretical, and review articles within the broad research tradition of Human Ethology, and will continue to publish book reviews and educational pieces. It will also invite target articles on which open peer commentaries are published.

The *Human Ethology Bulletin* aims to provide a platform where more solid foundations for the study of human behavior may be published and discussed, together with developments arising out of that work, and thereby contribute to the development of a more reliable scientific understanding of human behavior.

### **Call for Papers**

The *Human Ethology Bulletin* will consider the following types of submissions:

- **Research Articles** (up to ~10000 words, including references, notes and captions) are expected to present a major advance. Research Articles include an abstract, an introduction, up to six figures or tables, sections with brief subheadings, and up to a maximum of about 40 references.
- **Theoretical Reviews** (up to ~10000 words, including references, notes and captions) describe new developments of interdisciplinary significance and highlight future directions. They include an abstract, an introduction that outlines the main theme, brief subheadings, and an outline of important unresolved questions. A maximum of 40 references is suggested.
- **Target Articles** (up to ~10000 words, including references, notes and captions) must make theoretical or methodological interventions into current controversies within Human Ethology, broadly construed. Like Research Articles, Target Articles include an abstract, an introduction, up to six figures or tables, sections with brief subheadings, and about 40 references.
- **Open Peer Commentaries** (up to ~1000 words, including references, notes and captions) consist of published, non-anonymous commentaries on peer-reviewed Target Articles from a dozen or more specialists across disciplines, co-published with the Author's Response. Open Peer Commentaries will be solicited from the general readership (not by special invitation, although commentaries by some selected individuals might be solicited by the Editor) upon the publication of each Target Article for the next issue of the *Human Ethology Bulletin*, and are due six weeks after the publication of the Target Article to leave sufficient time for peer review.
- **Author's Response to Open Peer Commentaries** (up to ~2500 words including references, notes and captions) will also be due six weeks after the publication of the Open Peer Commentaries to leave sufficient time for peer review.
- **Brief Reports** (up to ~2500 words including references, notes and captions) present important new research results of broad significance. Reports should include an abstract, an introductory paragraph, up to four figures or tables, and up to a maximum of about 30 references.
- **Book Reviews** (up to 2000 words including references, notes and captions) present descriptions, evaluations, and critiques of new or recent books of theoretical, empirical, or practical importance to Human Ethology

and related disciplines. Many Book Reviews are solicited by the editors, but unsolicited submissions are also considered.

- **Technical Comments** (up to 1000 words, 2 figures or tables, and 15 references), are published in full and discuss research papers published in the *Human Ethology Bulletin* within the previous 12 months. Authors should submit a brief abstract (60 words or less) to accompany their comment that will be included in the Letters section of the print edition. The authors of the original paper are given an opportunity to reply. Comments and responses are peer reviewed and edited as needed. Technical Comments posted elsewhere, in print or online, including on preprint servers, will generally not be considered.
- **Brevia** are brief contributions (500 to 1000 words including references, notes and captions) accompanied by one illustration or table that must be contained on one printed page. Authors should also submit an abstract of 100 words or less that will appear online only.

## Present and Future Submissions

For the time being, all submissions should be formatted in APA style and should be sent electronically as an attached Microsoft Word 2003 document to the Editor-in-Chief, Aurelio José Figueredo, at [ajf@u.arizona.edu](mailto:ajf@u.arizona.edu). Hard copies may on occasion be accepted, as long as they are accompanied by the same text and graphics (where appropriate) on CD, DVD, or USB drive.

We will eventually be moving to a fully web-based submission and review system. However, these things take time and we cannot guarantee immediate functionality. When we do adopt a fully web-based format, we may need to revise the posted guidelines so that the maximum word counts can be

enforced electronically by the software. However, no automated software will ever be allowed to make the final decisions. If any contributing author believes that their submission merits an exception from these guidelines, they may write a letter of justification to the Editor, requesting such an exception. The letter has to clearly state the reasons that the extra word limit is required for adequate scientific communication, and **the final decision will always be made by a living human being.**

All submissions must be in English. All submissions, including invited contributions, are subject to both peer and editorial review. Some submissions are rejected, but political censorship is avoided so as to foster free and creative exchange of ideas among scholars. All submissions should be original, and are not to be published elsewhere, either prior to or after publication in the *Bulletin*, without explicit and prior permission from the Editor.

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## Summer Institute in Human Ethology Prague, Czech Republic 5-9 July 2011

*by Tom Alley, Program Committee Chair*

ISHE, together with Charles University, will sponsor a **2011 Summer Institute in Human Ethology**. ISHE Summer Institutes have been developed to be more student-friendly than many scientific conferences, and include generous financial support for student participants (such as free registration and lodging for students who are first authors of accepted presentations). Previous ISHE summer institutes were held in Andechs, Germany (2007) and the University of Maine, U.S.A. (2009).

The 2011 meeting will be held **5 July (Tuesday p.m.) through 9 July (Saturday)** at Charles University near the central area of Prague in the Czech Republic. Situated on the scenic Vltava River, Prague is home to many famous cultural, architectural and historical attractions. The extensive historic center of Prague is on the UNESCO list of World Heritage Sites. Tours of the Old Town or the Prague Zoo will be available to registrants on 9 July. A conference banquet will follow.

The 2011 program will include a keynote address by Jay Belsky, invited speakers, student-oriented workshops, a poster session, and 24 additional peer-reviewed oral presentations. The program Committee has finished its review of the many submissions and notified all potential presenters. The list of all presentations, including titles, is available for viewing on the ISHE website (see Summer Institutes on [www.ISHE.org](http://www.ISHE.org)). The final schedule should be available shortly.

### Invited speakers:

- Jay Belsky (Univ. of California-Davis, USA) – *Keynote Speaker*
- Jaroslav Flégr (Charles University: Czech Republic)
- S. Craig Roberts (University of Stirling, Scotland)
- Wulf Schiefenhövel (Max Planck Institute: Andechs, Germany)

### Workshops:

- Aurelio José Figueredo – How to apply life history theory to the study of human ethology: Evolution, genetics, development, measurement, and implications
- Jitka Lindová & Marc Méhu – Ethological analysis of nonverbal behaviour
- Jan Havlíček et al. – Performing research in human chemosignalling
- David Puts – Voice manipulation and analysis

### Local arrangements:

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- Tom Alley [Chair] – (Clemson University, SC, USA)
- Jan Havlíček – (Charles University, Prague, CZ)
- Daniel Kruger – (University of Michigan, USA)
- Peter LaFreniere – (University of Maine, USA)
- Elisabeth Oberzaucher – (University of Vienna, Austria)

# Obituary

## *Hiram Caton:*

16 August 1936 – 13 December 2010

By **Wulf Schiefenhövel**

At present: President, *ISHE*; Fellow, *Hanse-Wissenschaftskolleg* (Institute of Advanced Study), Delmenhorst, Northern Germany

It was an exceptional winter in the Alps about twenty years ago. A group of colleagues had been invited to a post-conference excursion by Irenäus (Renki) Eibl-Eibesfeldt to his "Hütte" above the village of Brixen in Northern Tyrol. It took more than an hour to make space for the cars. The snow was about a meter deep. Hiram Caton dragged his heavy suitcase up the steep track to the cabin. Strong words were uttered in that unmistakable English. Aussies from Queensland don't usually have to fight with arctic conditions. Near the fire place the trying effort was soon forgotten and a lively, sometimes heated discussion went on, as was customary in this man's company.

Hiram Caton died on 13 December 2010, at the age of 74. He was one of the really active members of our society.

He received an earned Doctor of Letters (D. Litt.) degree from famous Yale University for his work as scholar specialized in modern history. And this area of research remained one pillar of his work also in later life. But he was not confined to this field. It must be rare for a historian to be elected (in 1994) Fellow of the well renowned Australian Institute of Biology. Hiram, Inaugural Professor of Humanities at Griffith University Brisbane and later Professor for Politics and History at that University, was knowledgeable in various fields. He co-founded, in 1980, the international and interdisciplinary Association for Politics and Life Sciences. A courageous step then as and

now building bridges between fields often enough at war with each other is a risky thing. Hiram did not shy away from difficulties of this kind. He liked challenges and often took stands opposite to the mainstream. Most notable was his conviction, held also by a few leading virologists, that the AIDS epidemic took place in the minds and labs of researchers, the discussions of politicians and the decisions of the medical people rather than in the bodies of patients.

Very influential was his book "The Politics of Progress. The Origins and Development of the Commercial Republic" which dug down deep into European and American history and went against the grain of the largely accepted Weberian view that capitalism and the victory of science and technology have their origins in Protestant ethics. This book was widely discussed and reviewed in more than 20 professional journals. It was obvious that its author had touched upon a critical issue and successfully attacked one of the sacred paradigms. Hiram Caton was interested in how modern science came about, how its innovative ideas can be traced back in history, and how science works and is administered in the political arena. Yet, more than institutions it was the human individual on which his research focused.

One of the most influential paradigm-deconstructions of our time was that of Margret Mead as ethnographer in Samoa and anthropologist portraying an alternative scenario of the *conditio humana*. Derek Freeman, in painstaking classic fieldwork, showed that she had violated almost all the rules of the trade which had been established by a long row of ethnologists before her, e.g. Bronislaw Malinowski who learned *Kilivila*, the language of Trobriand Islanders, spent so many hours carefully interviewing his informants and then writing it all up in detailed accounts. They can still be checked today and most findings (except the ones about child sexuality and

ignorance of biological paternity) turn out to still be true. This is the way ethnology, a soft science especially in the days before audiotapes, 16 mm film and video, must present its data. Derek Freeman made the world recognize that the Empress had no clothes on and thereby did science an invaluable service. Hiram Caton, who was always intrigued by cult leaders and their groupies, wrote a book (*The Exalted Self: Derek Freeman's Quest for the Perfect Identity*) about his colleague and coworker Freeman, based on careful archival research and personal knowledge. He sees a narcissistic-personality disorder as the basis of Freeman's dedication to show how Samoan life really was and to prove Mead wrong. This may well be true. Many a scientist in pursuit of what she or he perceives to be a fundamental issue might be placed by others into the group of somewhat queer people. But like Ekkehart Malotki's devastating blow, also based on years of careful fieldwork, to the Whorfian claim of Hopi "timelessness", Derek Freeman will always be remembered as the one who showed that alternative human worlds are not so very likely, not even on a far-away island in the Pacific.

Hiram Caton used the magnifying glass of his sharp mind to screen an even bigger icon: Charles Darwin, again, sympathizing with this great man. I remember well the discussions I had with Hiram about the somewhat enigmatic, almost crippling disease Darwin so very badly suffered from after his return from the voyage with the *Beagle*. It was one of those happenstances which occur in our lives: The number of great figures ancestral for a field and its interesting topics is limited and influenced by the *Zeitgeist*. "Great minds think alike" is how we try to explain those incidences. I had been able to stroll through the Down House before the rest of the visitors (mostly school children) were let in and was deeply touched by the atmosphere in this refuge of the great man where he took shelter from life outside, so often troubling him. I saw the curtain in the

corner of the study and learned that there was a kind of toilet where the giant of evolutionary thought could pacify, as much as possible, his rebellious intestines. "Lactose intolerance" flashed through my mind, in milk-prone England perhaps a possibility. I knew that the accepted hypothesis is that Darwin was bitten by a *vinchuca* bug (*Benchuca* in Darwin's diary) of the *Triatominae* subfamily and thereby contracted Chagas disease, a common consequence of infection with *Trypanosoma cruzi*. Intestinal complications of this tropical zoonosis are less common than cardiac and cerebral ones, so I thought I had a point for my distant diagnosis. Hiram was, in our dispute, decidedly of a different opinion. In addition to the Chagas disease interpretation, plus Darwin's known anguish connected to becoming a rebel against God and society with possible psychosomatic effects plus the view of Ralph Colp, Jr., a psychiatrist who had found signs of an extremely labile parasympathetic nervous system in Darwin, Hiram had another hypothesis: The great man suffered from Avoidant-Personality Disorder with extreme shyness, fear of being rejected, self-deprecation, striving for acceptance and psychosomatic symptoms. Hiram himself saw the discrepancy of his diagnosis to some of the known traits of Darwin's personality: a very balanced man, successfully working, from time to time, as peace judge for the local community, liked by everyone, and loved by his children, almost a tiger when he needed to be, e.g. after Alfred Russel Wallace's letter to him. "It's like a miracle" Hiram himself stated on his webpage.

In all his writings on a wide array of topics, Hiram Caton was concerned with the human being. Being open to psychology, biology and evolutionary science made him the pioneer of human ethology in Australia, again against the trend prevailing in the academia of those days, particularly in Australia: post-modern science, constructivism, cultural relativism, fight against "biological reductionism" and the belief that humans are shaped by their socio-economic

environment, echoing the Marxian dictum "*Das Sein bestimmt das Bewußtsein*". To be convinced that an important part of our history is phylogeny and that our ancestors have been shaped by mutations and the forces of selection and to defend that position demands a strong person. In two books, Hiram Caton criticized radical feminism and other political movements for trying to undermine the family as the basic unit of society and its crucial role for successful early ontogeny.

Hiram was courageous in the choice of his research topics and in making his findings public. In contrast to many members of the older (my) generation, he really came to grips with computer technology and all the new options it facilitates. Hiram served as ISHE Information Officer from 2005 to 2008, and we on the board of ISHE benefitted from his drive and knowledge. He urged us to have a better relationship with the scientific press and the academic world. Yet, we still don't have a "press room" where new findings from ISHE colleagues would be presented, in a professional way, to those who mediate them to the interested public. Other scientific societies and especially big scientific institutions (e.g. the *Senckenberg Gesellschaft für Naturforschung* in Germany) have gone this way by now. We in the board of ISHE will have to see how we will position ourselves, a relatively small international society, in the shark tank out there.

I thank Hiram for his role in a crucial time of ISHE and we will miss his company, his Australian humor, his provocative ideas, and the talks around a fireplace.

**Wulf Schiefenhövel, Ph.D.**, co-founded ethnomedicine in Germany, performing field studies in New Guinea on traditional medical beliefs and practices. Since then, he has done continuous fieldwork in ethnomedicine, anthropology, and human ethology, mainly in Melanesia and Indonesia, authoring 300 papers, either authoring, coauthoring, or coediting 24 books, and publishing scientific films.

# Theoretical Articles

## Understanding Sex Differences in Human Mortality Rates through Tinbergen's Four Questions

By **Daniel J. Kruger**

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### Abstract

Sex differences in human mortality rates emerge from a complex interaction of genetic heritage and developmental environment. Although mortality is not in itself a behavior, it is an indirect product of behavior and physiology and thus responsive to life history variation in resource allocation, behavioral tendencies, and relevant environmental conditions. The explanatory framework of Tinbergen's Four Questions is sufficiently powerful in generalization to promote understanding of this phenomenon. Excess male mortality is a result of a trade-off between competitiveness and longevity. Male life history gives greater emphasis to reproductive effort at the expense of somatic effort, and mating effort at the expense of longevity compared to female life history. Men exhibit riskier behavioral patterns and greater physiological susceptibility, dying at higher rates from behavioral and most non-behavioral causes across the lifespan. The magnitude of the sex difference in mortality in developed nations peaks when males sexually mature and enter



into mating competition. Social and environmental conditions intensifying male competition for resources, status, and mates lead to increased male mortality.

**Keywords:** Tinbergen, Four Questions, Sex Differences, Sexual Selection, Mortality

## Introduction

Being male is now the single most prominent demographic risk factor for early mortality in highly developed societies (Kruger & Nesse, 2006). Numerous studies document sex differences in longevity and mortality rates, yet those researchers lacking an evolutionary framework are still grasping for a full understanding despite statistically powerful data driven models (e.g., Rogers, Hummer, & Nam 2000). Darwin (1871) considered male intrasexual competition the best explanation for why mammalian males are significantly more physically aggressive than females. Long after Darwin's insights, most explanations of sex differences in human aggression, violence, and mortality are still based only on proximate factors. In the past few decades there has been a revival of the recognition that such sex differentials emerge from an interaction of characteristics shaped by sexual selection and environmental conditions of development (e.g., Daly & Wilson 1978).

Although mortality is not in itself a behavior, it is an indirect product of behavior and physiology and thus responsive to life history variation in resource allocation, behavioral tendencies, and relevant environmental conditions. Tinbergen's (1963) Four Questions framework is sufficiently powerful in generalization to promote an integrated understanding of this phenomenon. Each of the Four Questions represents a unique and necessary aspect for a comprehensive explanation. Such a framework helps illustrate the complex network of relationships between causes emerging at different levels, maintaining an appropriate balance between the

reductionism necessary to isolate independent mechanisms and the holistic understanding of the interrelationships among causes and mechanisms. Tinbergen includes the evolutionary (ultimate and integrative) causal explanations of adaptation (function) and phylogeny (evolutionary history), as well as the necessarily mechanistic explanations of more immediate (proximate) causal mechanisms and their ontogeny (developmental processes) during the lifespan of the individual.

Before discussing sex differences in mortality rates, it may be informative to outline evolutionary theory regarding mortality in general. One may initially wonder why evolutionary processes occurring over billions of years and millions of generations have not led to perfected complex organisms that can live indefinitely. However, the processes of natural and sexual selection maximize the survival of genes rather than the survival of individuals or species (Williams, 1957; Dawkins, 1976). Building and maintaining a body is in the service of reproduction: our bodies are essentially vehicles for the propagation of genetic information. The effort an individual expends on building and maintaining a body is ultimately for the purpose of reproduction.

Many genes have multiple effects (this is referred to as pleiotropy), which can be both beneficial and hazardous based on the developmental and environmental context. Genes with early benefits but later costs will be selected for because younger individuals have a higher reproductive value (Medawar, 1952). Selection pressure was greater at younger ages because few people survived to old age in ancestral environments, thus early acting beneficial genes spread faster than late acting beneficial genes. The cumulative result of these factors is senescence, a decline of physiological function over time (Williams, 1957). The relatively higher importance of reproduction at the expense of survival for the sake of longevity

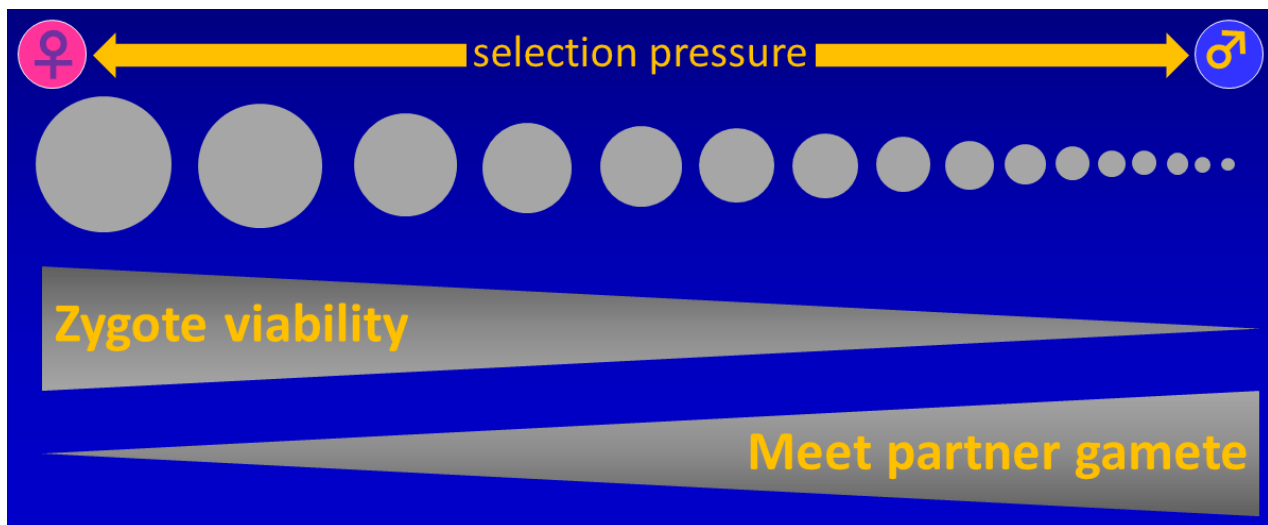
also forms the basis for sex differences in mortality rates ultimately created by the processes of sexual selection.

### Evolutionary Adaptation

Each of Tinbergen's Four Questions represents a different, independent but interconnected aspect of a more comprehensive explanation. In this case, it may be most useful to begin the discussion with the evolutionary history underlying sex differences in mortality. The ultimate functional framework provides a deep understanding of the systematic origins of excess male mortality, of course not considering mortality as an adaptation per se. Stable aggregate sex differences result from sexual selection, the processes of intra-sexual competition and inter-sexual selection, as well as selective pressures related to sex specific roles such as gestation. The basic properties of sexual reproduction define the male and female sexes, and explain why they differ from each other.

The vast majority of complex animal life reproduces sexually across generations. Genetic recombination helps purge harmful mutations, and genotypic variability facilitates adaptation to changing environmental conditions (Williams, 1975); competition from other species (Bell, 1982); predators and parasites (Williams, 1975); countering the adaptations of prey to predation; and starvation (Bell, 1982). Sexual reproduction entails the combination of gametes from a pair of parents. Larger gametes give zygotes greater viability; production of smaller gametes gives quantitative advantage and smaller gametes will be relatively more successful than intermediate sized gametes when large partner gametes are present. Thus, there is disruptive selection for gamete size (Bulmer & Parker, 2002). The definition of sex follows from this divergence in gamete size; females contribute larger gametes than males (See Figure 1). The cascade of effects responsible for aggregate differences between females and males originates from this sex difference in investment.

**Figure 1.** Divergent Selection Pressure Leads To the Fundamental Sex Difference in Parental Investment.



Because females usually invest considerably more than males in offspring, and are more limited in the quantity of offspring they can produce, they are selected to be choosier in considering partners (Bateman, 1948; Trivers,

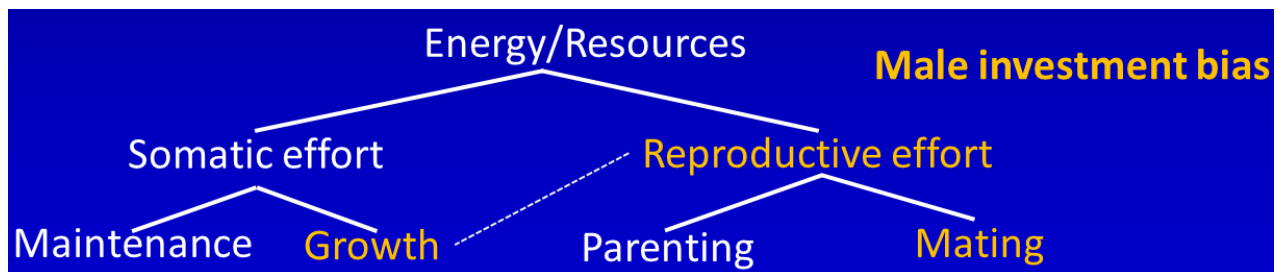
1972). Male reproductive success is largely dependent on securing mating opportunities, through both intrasexual competition with other males and by being chosen by females in intersexual selection because of the

attractiveness of their traits and displays (Darwin, 1871). Male reproductive success is driven by sexual access to fecund females and genes enhancing sexual access and offspring production will be selected for even if they also increase risk of injury, sickness, and early death (Daly & Wilson 1978; Möller, Christe, & Lux 1999). For example, male guppies devote less time to foraging when novel females are present and those able to mate with a series of unfamiliar females will exhibit lower lifetime growth, demonstrating the trade-off between somatic and reproductive effort (Jordan & Brooks, 2010).

Mammalian male reproductive success usually benefits more than female reproductive success from a greater number of sexual partners and the greater variation in male reproductive success compared to females heightens male

competition for reproductive access to females (Bateman, 1948; Trivers, 1972). This selected for relatively higher male investment in reproductive effort at the expense of somatic maintenance and relatively higher investment in mating effort at the expense of parental effort (See Figure 2, males allocate more effort to aspects highlighted in gold, at the expense of effort for alternative aspects within sets). Compared to women, men on average have greater height and weight, more upper-body strength, higher metabolic rates, and later sexual maturity (for a review, see Miller, 1998). These attributes facilitate direct male competition for mates, as well as competition for the resources and social status that make men attractive to prospective partners (Wilson & Daly, 1985).

**Figure 2.** Male Investment Bias in Life History Strategy.



Male tendencies for risky behavior were selected for because they ultimately enhanced reproductive success, through the promotion of social status, resource control, and success in mating competition (Wilson & Daly 1992). Historically, men who controlled more resources married younger women, married more women, and produced offspring earlier (Low, 1998). Women across cultures value male social status and economic power (Buss, 1989) and these predict male reproductive success across a wide variety of societies (see Hopcroft, 2006). There is some differentiation of status even in relatively egalitarian foraging societies, and higher status men have better mating success (Chagnon 1992; Hill & Hurtado 1996).

Male competition can be hazardous, violent, and sometimes fatal (Betzig, 1986; Kaplan & Hill, 1985). Because sex differences in parental investment and mating competition are ultimately responsible for sex differences in mortality rates, we predict that the intensity of male mating competition (in interactions both within and between groups) will be proportional to the degree of excess male mortality.

Campbell (1999) concurs that aggression and violence have a much greater role in reproductive strategies for men than for women and agrees that sex differences in parental investment are the ultimate explanation. However, she emphasizes the greater potential

harm for women's reproductive success as the primary factor, as child survival is threatened more by maternal than paternal death. Taylor, Klein, Lewis, Gruenewald, Gurung, and Updegraff (2000) also build on sex differences in parental investment to argue that in contrast to the male biased fight or flight response, women respond to threats by tending and befriending in order to cultivate strong social bonds and protect the vulnerable.

### **Phylogeny**

Cross-species comparisons provide valuable insights on the relationship between reproductive strategies and the relative sex difference in mortality rates. Tracing phylogenetic patterns helps reconstruct the evolutionary origins and history of attributes and behaviors, identifying both promoting and constraining influences on excess male mortality. Females typically outlive males across most animal species (Hazzard, 1990), reflecting trade-offs that increase male reproductive success even at the expense of longevity (Møller, Christe, & Lux 1999).

Reproductive patterns influence the intensity of sexual selection for each sex. Sex differences in physiology and behavior follow from the degree of polygyny, which could be thought of as the extent of male reproductive inequality. Polygyny is common amongst mammalian species, likely due to the relative male specialization in mating effort and female specialization in infant care and nutritional provisioning (Low, 2003, 2007; Reichard & Boesch, 2003). In highly polygynous species, a few males virtually monopolize reproductive success, creating powerful selection for traits that lead to success in mating competition, even if these traits are also detrimental to the health and longevity of high proportions of individuals (Williams, 1957; Kirkwood & Rose, 1991; Stearns, 1992). Species with higher degrees of polygyny have greater male competition and relatively more risky male behavior (Plavcan, 2000; Plavcan & van Schaik

1997; Plavcan, van Schaik, & Kappeler 1995), larger size and armor of males, and higher male mortality rates as compared to females (Leuttenegger & Kelley 1977). After controlling for the effects of phylogeny, there is a strong association between sexual size dimorphism and sex differences in mortality across mammalian taxa, demonstrating the role of the intensity of sexual selection (Promislow, 1992).

Across vertebrate species, the longevity gap between males and females is predominantly for polygynous species (Clutton-Brock & Isvaran, 2007). Elephant seals often illustrate the properties of polygyny in educational texts and presentations. Male elephant seals compete for control of harems of about 30 females and male reproductive success is highly skewed. Males who control harems obtain the vast majority of matings and 80% of males die before reproducing. Male development takes twice as long and adult males are three to four times the size of females (Harvey & Clutton-Brock, 1985). Similar patterns occur in other highly polygynous species such as peacocks and peahens.

Male primates compete to gain access to desirable mates, making displays of status, warding off potential competitors with loud warning calls, demonstrating strength, fighting with other males, and in some species (humans and callitrichids) provisioning resources (Buss, 2005). Male langur monkeys engage in vicious competitions for control of harems, leading to high levels of male mortality (Hrdy, 1977). When two or more Barbary macaque males are near an estrous female, they engage in scream fights and true fights (Kuester & Paul, 1992). In scream fights, males approach each other within 10 meters and begin screaming at each other. These scream fights may escalate into true fights, including hitting, thrashing, and biting (Kuester & Paul, 1992). The rate of male physical injuries caused by other males increases sharply during mating season,

demonstrating the association with maximizing mating opportunities (Kuester & Paul, 1992).

Male Japanese macaques establish a social dominance ranking system based on physical aggression. Dominant males are more likely to mate with females during their fertile periods, though males favored in female mate choice sired more offspring regardless of their social dominance (Soltis et al., 1997).

Mitsunaga, Shimizu, Nozaki, Yanagihara, Domingo-Roura, & Takenaka, 1997). In savannah baboons, there is a very large positive correlation between male dominance rank achieved through successful fights with rival males and mating success (Alberts, Watts, & Altmann, 2003). Male yellow and anubis baboons form coalitions to fight a common male threat; male mating opportunities do not strictly follow to their rank in the dominance hierarchy (Bulger, 1993). Chacma baboons do not form coalitions, and male mating opportunities follow directly from social rank (Bulger, 1993).

Male orangutans lead a largely solitary lifestyle, using loud "long calls" to keep lower-ranking males out of their vicinity (Galdikas, 1979). These calls are effective at signaling the dominant males' location to females and keeping lower-ranking males at bay; however they will actually attract fellow dominant males, who presumably arrive to displace the calling male. The rare male orangutan interaction consists of intense physical aggression over social ranking and/or a desired mate (Mitani, 1990). Like male orangutans, mountain gorillas are considered to have a one-male mating system (Harcourt, 1981). Most males do not have to engage in male competition with other resident males for fecund females; physical aggression occurs in encounters with out-group males and to prevent local females from joining a different group (Sicotte, 1993). Still, around 40% of mountain gorilla groups are multi-male (Weber & Vedder, 1983). These males may benefit from

the numerical advantage in forming coalitions against out-group males and lower rates of infanticide caused by other adult males (Robbins, 1995). In two multi-male groups, a social dominance hierarchy formed and dominant males accounted for 83% of the observed matings (Robbins, 1999). Aggressive behaviors between male mountain gorillas include grunting, screaming, chest beating, hits, kicks, and bites (Harcourt et al., 1993; Robbins, 1999).

Among bonobos and (common) chimpanzees, our closest living primate relatives, we see many parallels to human social behavior related to male competition. In chimpanzees there are cases of both inter-group and intra-group male aggression and killings (Boesch, Head, Tagg, Arandjelovic, Vigilant, & Robbins, 2007; Fawcett & Muhumuza, 2000). Male chimp coalitions systematically raid neighboring territories, killing the resident males and expanding into their territories (Mitani, Watts, & Amsler, 2010). Larger male bands control more female territories. As chimpanzees form social groups to protect themselves from out-group members, intra-group killings are extremely rare and may be a result of extreme intrasexual competition among males (Wilson & Wrangham, 2003). For example, Fawcett and Muhumuza (2000) documented intra-group male members killing another male in their cohort when the number of cycling females was extremely low. Both wild (Hill, Boesch, Goodall, Pusey, Williams, & Wrangham, 2001; Goodall, 1986; Nishida, 1990) and captive chimpanzee populations (Dyke, Gage, Alford, Swenson, & Williams-Blangero, 1995) have higher male than female mortality rates.

Bonobos are notable for being a peaceful species with very little violence or overt intrasexual competition (de Waal & Lantig, 1988). Bonobos form matrilineal groups with strong female alliances that may have led to low levels of aggression and sexual coercion (Wrangham, 1993). Yet male-male aggression

increases in frequency and intensity on mating days and corresponds to the number of estrous females, and the aggressors mated more often than their targets (Hohmann & Fruth, 2003).

Humans are much less polygynous in comparison to most other primates, but the vast majority of cultures (84% of those documented by anthropologists) allow for polygynous relationships (Ember, Ember, & Low, 2007) and the variation in male reproductive success is substantially higher than in female reproductive success. Women favor men with abundant access to resources and phenotypic cues of gene quality (Gangestad & Thornhill, 1997; Lancaster, 1989; Buss & Schmitt, 1993). Because a few males gain a disproportionately high number of matings, male mating competition is a potent selection force (Betzig, 1986). The degree of physical sexual dimorphism is directly related to the level of male mating competition (see Bribiescas, 2006), and human females are on average 80% as large as males (Clutton-Brock, 1985).

### **Proximate Causation**

Sexual selection has resulted in a variety of human sex differences in psychology and behavioral tendencies related to mortality, including the greater male tendencies for risk-taking, competitiveness, aggression, and sensitivity to position in social hierarchies (Cronin, 1991). This accounts for many of the immediate causal mechanisms within and outside the individual for sex divergent mortality patterns. Mating competition among men includes potentially lethal violence in conflicts both within and between groups (Chagnon, 1988). Archeological evidence indicates that a much higher proportion of individuals died from violent acts than those in modern societies (e.g., Schulting, 2006). Foraging societies frequently feature opportunistic raiding and ambushes, which are more common than organized formal battles (Buss, 1995; Ember, 1978; Keeley, 1996). These conflicts emerge from motives to retaliate for

previous killings, acquire resources, elevate personal prestige, and acquire women. Yanomamo men who have killed have higher social status and more wives than those who have not, thus about 40% have killed other men (Chagnon, 1988). Violent inter-tribal conflict long preceded the arrival of Europeans in the Americas. Around 1325 CE, half a thousand individuals died violently in a single incident in the Dakotas and none of the remains found were of young women (Keeley, 1996). In contrast to contemporary fictive depictions, warfare is typically less frequent in tribal groups after contact with modern societies (Keeley, 1996).

Human mortality patterns and sex differences in mortality rates have been influenced by numerous historical factors. In about the past 10,000 years, the rise of agriculture and domestication of animals led to higher mortality rates from infectious diseases, facilitated by increasing population size and density, increased mobility, and the greater prevalence of pathogens transferred from other animals (Diamond, 1997). In the last two centuries, modern public health and sanitation measures, vaccination, antibiotics, and other features of scientific medicine have resulted in a major epidemiological transition from mortality mainly caused by infection, other acute diseases and pregnancy and childbirth, to mortality resulting mainly from chronic diseases related to lifestyle and aging in technologically advanced nations (Lopez, 1998). As the massive and relatively sex indiscriminate death rates from infection decline, and as deaths from childbirth decrease, mortality discrepancies arising from behavioral causes become proportionately much more prominent (Kruger & Nesse, 2004). Technological innovations in transportation, weaponry, and manufacturing have exacerbated sex differences in mortality from risky behaviors. The proportionate contribution of causes of death mediated by health related behaviors, such as smoking and poor diet, has also increased sex differences in

mortality in middle and late adulthood (Kruger & Nesse, 2004). In many countries, this secondary peak reached its highest levels a few decades ago and is gradually declining (Kruger & Nesse, 2004), perhaps from historical reductions sex differences in rates of health impacting risky behaviors such as tobacco smoking. Overall, the discrepancy between male and female mortality rates steadily increased in developed nations across the twentieth century (Kruger & Nesse, 2004; Lopez, 1998; Zhang, Sasaki, & Kesteloot, 1995).

We consider the ratio of male to female mortality rates to be a useful indicator reflecting the interaction of evolved strategies and socio-environmental conditions. Thus, we utilize the Male:Female Mortality Ratio (M:F MR) in our descriptive results, as it efficiently indicates population characteristics such as the severity of male-male competition, environmental uncertainty, and the degree of variance in resources and social status. In the contemporary USA, cardiovascular disease accounts for the single greatest proportion (26%) of excess male life years lost beyond female mortality rates. External causes account for 35% of excess male life years lost, including non-automobile accidents (10%), suicide and auto-accidents (both 9%), and homicide (7%). Malignant neoplasms (cancer) account for 8%, liver disease and cirrhosis 3%, congenital abnormalities 2%, and cerebrovascular disease (stroke), pneumonia & influenza, and diabetes mellitus each account for 1% (Kruger, & Nesse, 2004). The remainder of causes account for approximately 23% of excess male life years lost; however all individual causes account for less than 1%.

Multiple levels of proximate factors influence mortality risk. Humans share the XX/XY sex-determination system with most other mammals. The Y-chromosome in males is considerably shorter than the X chromosome and contains an incomplete set of alleles. Thus, males are more susceptible to harmful

mutations on the X chromosome because there are less likely to have the normal counterpart (Smith & Warner, 1989). Whereas female sex hormones appear to have beneficial physiological influences (Lawlor, Ebrahim, & Smith, 2001), testosterone has a detrimental impact on many somatic systems (Folstad & Karter, 1992; Hazzard, 1990). Male secondary sexual characteristics are dependent on testosterone levels; this dynamic represents a trade-off between reproductive and somatic investment. Males are more vulnerable to infection and parasites because of the interference of testosterone with immunological systems (Hazzard, 1990; Kraemer, 2000; Moore & Wilson, 2002). High ranking chimpanzee males have both higher testosterone levels and increased parasite burden.

(Muehlenbein & Watts, 2010). Male New Zealand fur seals who facilitate mating by establishing territories also have both higher testosterone levels and increased parasite burden compared to non-territorial males; territorial males show both more aggressive behavior with other males and more sexual behavior with females in this moderately polygynous species (Negro, Caudron, Dubois, Delahaut, & Gemmell, 2010). Larger male body size also poses greater physiological costs (Owens, 2002). Increased dietary fat consumption has led to epidemic cardiovascular disease in Western Nations in recent decades. This has disproportionately affected men in part because they are more susceptible to atherosclerosis at any given level of fat intake (Lawlor, Ebrahim, & Smith, 2001).

Epidemiologists are beginning to recognize the evolutionary origins of riskier male behavior in their recommendations for health-promoting interventions (e.g., Nell, 2002). Men consume greater amounts of alcohol than women, contributing to substantially higher mortality from chronic liver disease and cirrhosis (Zhang, Sasaki, & Kesteloot, 1995). Men also smoke more tobacco than women, though the sex

differential in mortality for lung cancer and stroke is declining because of decreases in male smoking rates (Lopez, 1998) as well as increases in female smoking rates (Pampel, 2002). Males die at higher rates from motor vehicle accidents, even accounting for sex differences in the number of miles driven (Jonah, 1986). Males also have much higher rates of death from violent behaviors (Daly & Wilson, 1997; Kraemer, 2000) and suicides (McClure, 2000). Occupational hazards increase mortality in disproportionately male professions (Hazzard, 1986).

Male tendencies for riskier behavioral patterns are ultimately a result of greater skew and variance in reproductive success compared to females. Wilson and Daly (1997) argue that this risk taking and discounting of future prospects could be a rational response to uncertainty in outcomes. They propose a convex-upward association between proximate outcomes of risk-taking (e.g., social status, resource control, mating opportunities) and reproductive success in unpredictable environments. Thus, these tendencies are maintained in the population because they provided sufficient reproductive benefits to some proportion of individuals to be, even if they are also detrimental to many individuals.

### **Developmental Ontogeny**

Human males are usually at greater risk of mortality at all stages of life. Pregnancies with male fetuses have higher miscarriage rates than those for females (MacDorman, Hoyert, Martin, Munson, & Hamilton, 2007). A male fetus will typically extract more resources from the mother to grow larger than females, leading to greater risks of pre-mature labor. Campbell (2005) argues that behavioral sex differences in childhood reflect preparation for the male status contests of adolescence. Boys are more assertive than girls at only a year and one month old (Goldberg & Lewis, 1969) and boys between 2 and 4 are more aggressive and destructive towards people and objects than

girls (Koot & Verhulst, 1991). Rough and tumble play is three to six times more frequent in boys than girls, consisting of chasing, capturing, wrestling, and restraining (DiPietro, 1981). This form of play appears to be a mechanism for establishing social dominance, something boys consider more important than girls do (Jarvinen & Nicholls, 1996). Male dominance hierarchies emerge at six years of age and relative social status predicts social rank nine years later (Weisfeld, 1999).

Sex differences in mortality from direct behavioral causes increase rapidly during adolescence (Kruger & Nesse, 2004, 2006a), corresponding to the activation of the reproductive neuroendocrine system (Bribiescas, 2006). The steady rise in adrenal androgens initiates the physical transition to adulthood, marking the life history transition from the somatic effort of building and maintaining the body towards reproductive effort. Male mating effort peaks in young adulthood in modern societies, consistent with violent behavioral patterns and injuries from accidents (See Figure 3). Men between ages 20 and 34 are most likely to commit and be the victims of homicide (Daly & Wilson, 1988). Young men may not yet have partners or offspring to invest in and thus can devote more effort to mating, and they may also be more attractive to females because they have not committed their resources (Hill & Kaplan 1999). Among Ache foragers, younger men fathered more children through extra-pair copulations than older men, who fathered more children through long-term relationships (Hill & Hurtado 1996).

In Western industrialized countries, male testosterone levels peak just after age 20, declining gradually until more rapid drops after age 40. Marriage leads to declines in testosterone, though levels increase following divorce (Mazur & Michalek, 1998), reflecting shifting life history. Men who grew up in working-class families during New Zealand's



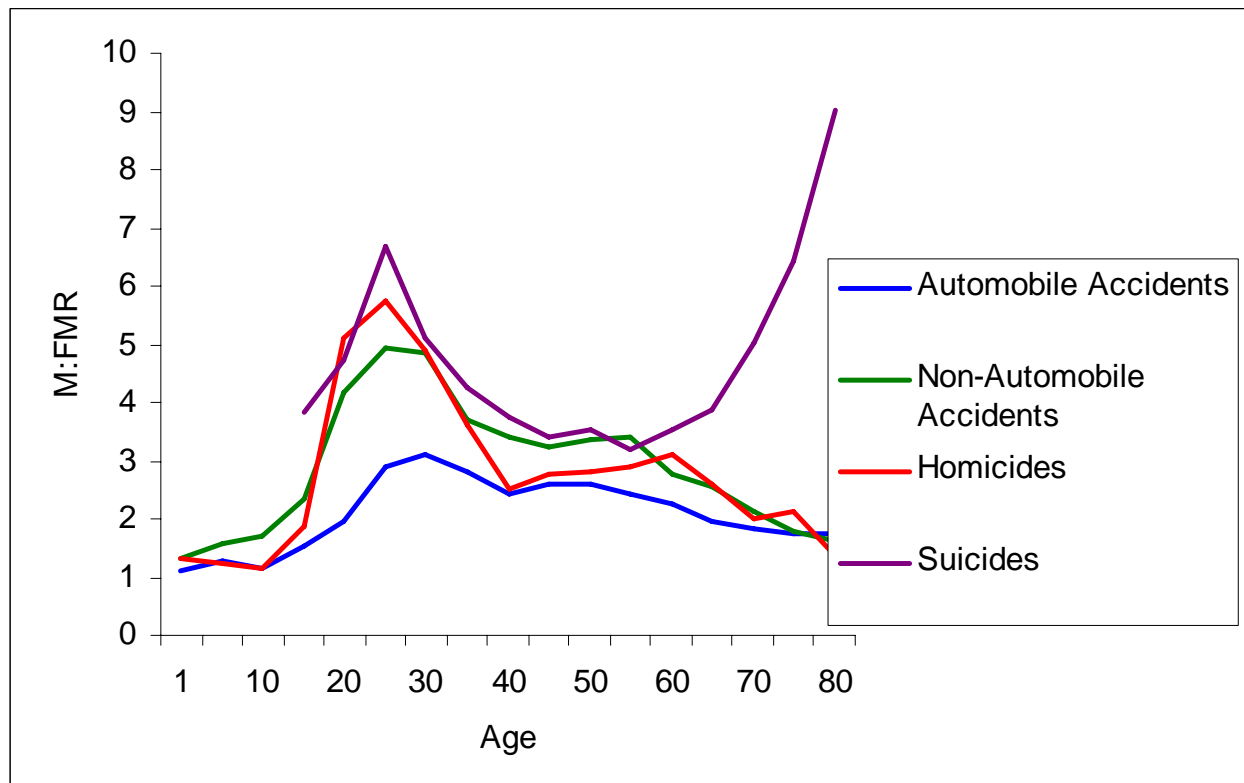
widespread unemployment of the 1980s and 1990s had low expectations for their futures and made little effort to build job skills or integrate with mainstream society - affiliating with anti-social cohorts and engaging in frequent use of alcohol and other drugs. However, these men generally become more pro-social, economically productive, and family oriented after having children (Rouch, 2010).

Life history patterns may differ somewhat in non-industrialized populations, where testosterone does not decline as rapidly in later adulthood (Ellison, Bribiescas, Bentley, Campbell, Lipson, Panter-Brick, & Hill, 2002). Among the Ache, for example, sex differences in mortality remain high throughout adulthood (Kruger & Nesse, 2006a). The forest dwelling Ache had a flexible social system allowing for

easy remarriage and most adult women had children by several different fathers. Organized club fighting gave women opportunities to evaluate mates and new partnerships would often begin after club fights (Hill & Hurtado, 1996).

Cardiovascular disease was apparently absent in the forest dwelling Ache (Hill & Hurtado, 1996). In industrialized countries, sex differences for behaviorally moderated internal causes peak in mid to late adulthood, consistent with the lag in the impact of health-related behaviors on mortality (Kruger & Nesse, 2004, 2006a). Internal causes of death comprise both the largest source of mortality and the predominant proportion of life years lost from excess male mortality in middle to late adulthood (See Figure 4).

**Figure 3.** Male:Female Mortality Ratios in The USA For External Causes During The Year 2000 (From Kruger & Nesse, 2004).



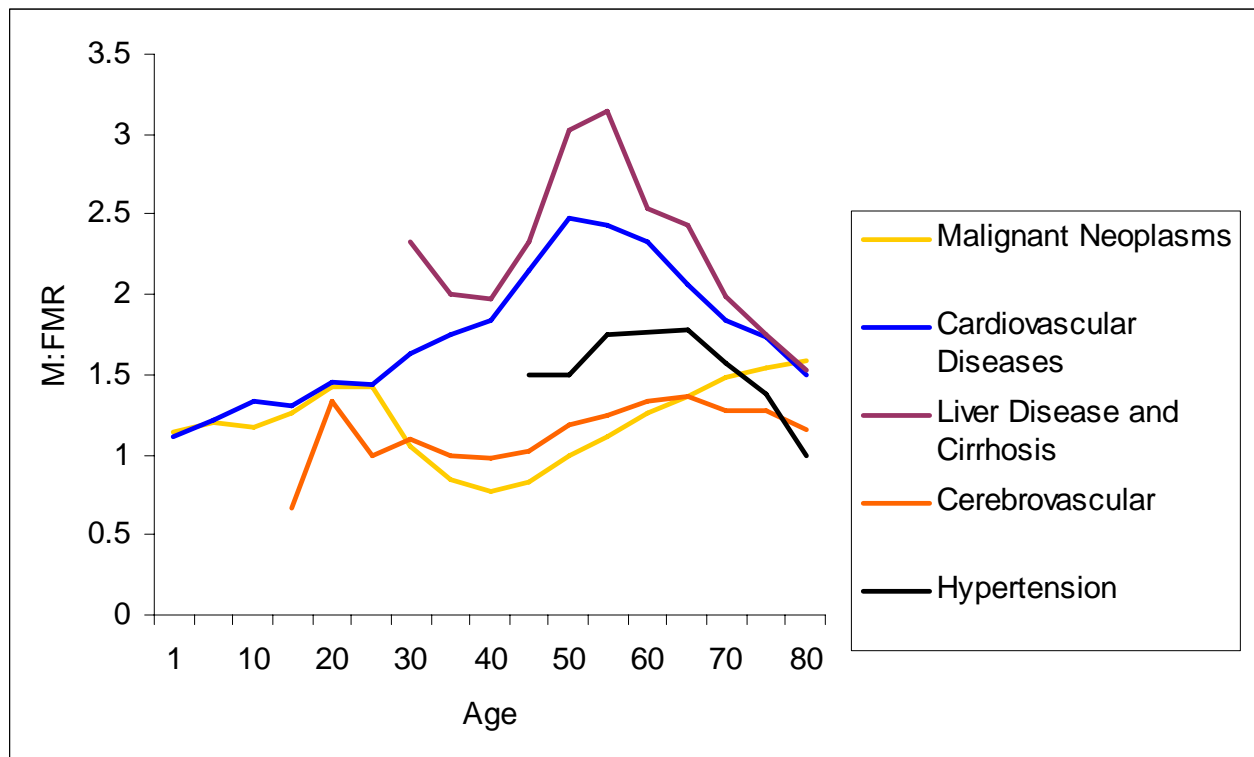
Environmental conditions, broadly defined, influence the magnitude of sex differences in

mortality. Social norms for boys to be tough and to not express emotions such as anxiety

and shame may encourage risky male behavior (Kindlon & Thompson, 1999; Kraemer, 2000). Environmental uncertainty is associated with riskier behavioral strategies, as opportunities may be unpredictable and fleeting (Chisholm, 1999; Figueredo, Vásquez, Brumbach, Sefcek, Kirsner, & Jacobs, 2005; Roff, 1992; Stearns, 1992). Neighborhood life expectancy predicts homicide rates, controlling for the impact of homicide (Wilson & Daly, 1997). Risk taking was higher among those who had lower lifespan expectations and perceived future events as less predictable (Hill, Ross, & Low,

1997). In environments with high pathogen load, where parenting cannot improve offspring survival, male strategies place more emphasis on mating effort including greater risk taking and violence (Quinlan, 2007). Men with relatively low social status and resources may adopt risky strategies, having less to lose and facing the historical price of failure in evolutionary terms. In the United States, sex differences in mortality rates are higher among those lower in income and education (Kruger & Nesse, 2006a).

**Figure 4.** Male:Female Mortality Ratios in the USA for internal causes during the year 2000 (From Kruger & Nesse, 2004).



The death rate from assaults is an order of magnitude more prevalent in Scottish routine laborers than managers and professionals (Leyland & Dundas, 2010). Children growing up in poverty are exposed to more violence (Sampson & Lauritsen, 1994), and this exposure is associated with individuals' tendencies for violent behavior (Salzinger, Feldman,

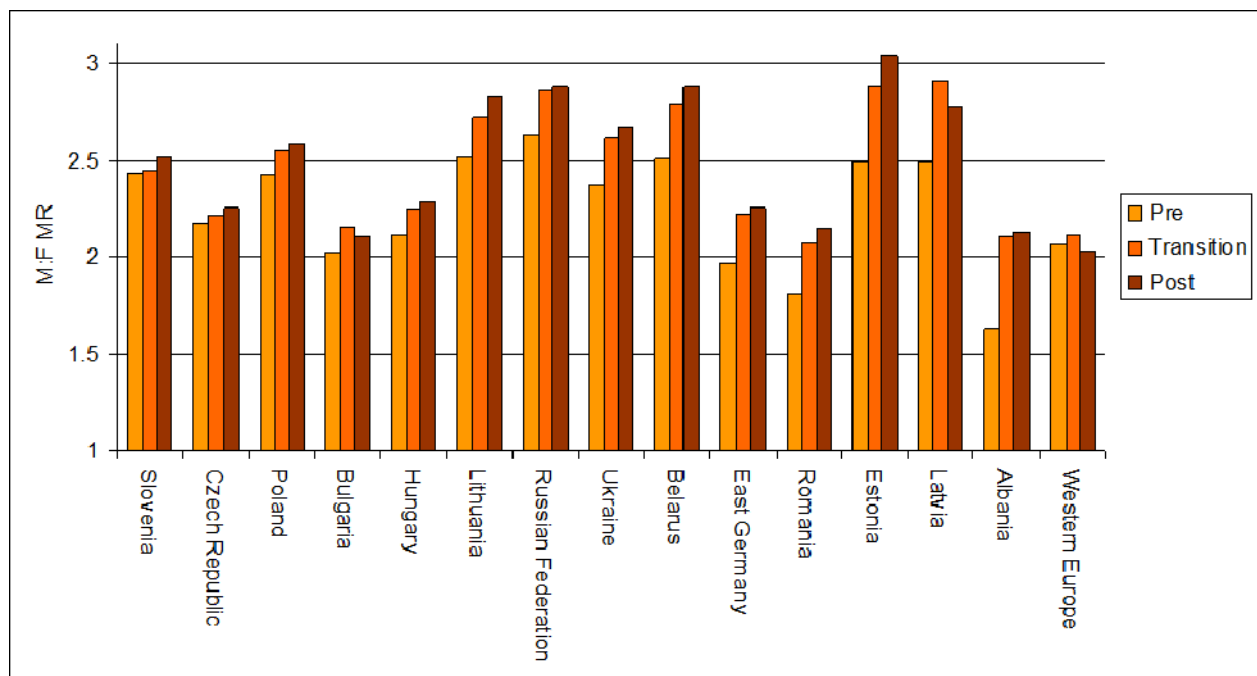
Stockhammer, & Hood, 2002). The extent of neighborhood poverty explained over two-thirds of the variance in violent crime in one Census Tract level study (Coulton, Korbin, Su, & Chow, 1995). Across history, men who had dim prospects otherwise became warriors, adventurers, and explorers (Daly & Wilson, 1988; Daly & Wilson, 2001).

The degree of inequality in outcomes historically related to male reproductive success will drive male competition and sex differences in mortality. Neighborhood income inequality predicts homicide rates (Wilson & Daly, 1997) and modern societies with greater degrees of economic inequality have disproportionately higher levels of male mortality (Kruger, 2010). Consistent with patterns observed across species, the degree of polygyny (indicating male reproductive inequality) is also associated with the degree of excess male mortality. Across nations, these two factors explain the majority of the variance in sex differences in mortality rates (Kruger, 2010). In addition, a relative population surplus of men increases mortality risk for men, but not women (Jin, Elwert, Freese, & Christakis, 2010).

Changes in environmental conditions associated with the intensity of male mating competition can influence sex differences on a

relatively short time scale. The variance and skew in social status and resources in Eastern Europe rose sharply during the rapid transition market economies in the 1990s (United Nations Development Program, 1998). Sex differences in mortality rates increased substantially for most of these nations, most prominently during early adulthood, especially compared trends in Western European countries during this period (See Figure 5; Kruger & Nesse, 2007). During the Croatian War of Independence in 1991-1995, evolved facultative adaptations responding to adverse and unstable environments apparently led to riskier behavioral strategies in the civilian population. Sex differences in non-war related violence and accidents peaked one year after the military conflict climaxed in intensity and the non-war male homicide rate was considerably higher for several years following the conflict compared to before (Kruger & Nesse, 2006b).

**Figure 5.** Male: Female Mortality Ratios across the Eastern European Economic Transition.



**Note:** Pre-Transition 1985-89, Transition 1990-94, Post-Transition 1995-1999 (From Kruger & Nesse, 2007).

## Conclusion

Tinbergen's Four Questions serve as a powerful framework for building a comprehensive understanding of sex differences in human mortality rates. They inherently and explicitly address many of the common misunderstandings of evolutionary explanations for human behavior and its consequences. The respective roles of proximate psychological mechanisms that facilitate adaptive behavior, social and cultural conditions influencing tendencies, and evolutionary selection pressures are clearly outlined, quashing confusions over these issues for careful readers. Cross-species comparisons illustrate how factors related to reproductive dynamics influence mortality patterns in predictable ways. Comparisons of groups within a society, associations between societies, and trends in societies undergoing theoretically relevant changes in conditions provide converging evidence. The development of behaviors across the lifespan and environmental influences shaping behavior complete the depiction of the causal framework. All evidence converges on the intensity of male mating competition as the crucial factor in predicting the degree to which males face greater mortality risk than females. Sex differences in mortality patterns emerge from the basic properties of sexual reproduction and co-vary with other important life history attributes both across species and within human populations.

Evolutionary theory is the most powerful explanatory system in the life sciences and is the only framework that can unify knowledge in otherwise disparate fields of research. Scholars of social and health issues and practitioners intervening with individuals and larger scales of organization would benefit considerably from an understanding of the basic principles of evolution and its consequences for humans. The eventual integration of evolutionary principles will

gradually enhance the effectiveness of health interventions and provide an ultimate explanation for otherwise puzzling patterns in health outcomes. Tinbergen's framework may accelerate the pace of this integration through its holistic explanatory utility.

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# Target Articles

## Hue and Luminosity of Human Skin: A Visual Cue for Gender Recognition and Other Mental Tasks

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### Abstract

Face recognition takes place within a distinct heritable module of the brain and includes the ability to distinguish between male and female human faces. To identify gender, this module targets a number of sexually dimorphic features, particularly the hue and luminosity of facial skin. Men look browner and ruddier in hue because melanin and blood are more present in their skin's outer tissues. Women have a higher luminous contrast between their facial skin and their lips and eyes. Hue seems to provide a "fast channel" for gender recognition. If the observer is too far away or the lighting too dim, the brain switches to the "slow channel" and targets luminosity. In addition to assisting gender recognition, the skin's hue and luminosity may also alter the observer's mental state in a number of areas, ranging from sexual attraction to emotional distancing.

**Keywords:** Face Recognition; Gender Recognition; Sex Differences; Sex Hormones; Sexual Dimorphism; Skin Color

### Introduction

An old Christian manuscript recounts the story of a man who went to live in a monastery with his infant son. As the boy became a young man, he began to see strange beings in his dreams. One day, he ventured with his father into the

outside world. On seeing some women, he exclaimed: "Father, those are the ones who would come to see me at night!" (Regnault, 1966, p. 73).

We do not learn to recognize the human face. Nor do we learn to identify whether it is male or female. This type of image is primarily recognized via an innate module that functions independently of other cognitive abilities. If this module ceases to function following brain damage, the result is a syndrome called prosopagnosia: the patient may seem to be like everyone else but will not recognize a normally positioned face more easily than any other object, including an upside-down face (Farah, 1996; Little et al., 2005; Pascalis & Kelly, 2008; Zhu et al., 2009). At the other extreme are "super-recognizers" who are as good at face recognition as prosopagnosics are bad (Russell, Duchaine, & Nakayama, 2009).

This should be no surprise. If an object appears in our visual field often enough, while being significant enough to our existence, we stand to gain by recognizing it automatically instead of having to learn its key features. Thus, natural selection will gradually hardwire recognition of familiar objects, like the human face.

This hardwiring can be thought of as a 'template' that responds to a limited set of visual cues. Although men and women differ physiologically in many ways, most of these differences are not readily visible and play no role in recognition of sexual identity. The face-recognition module does not recognize male and female faces, *per se*, but rather two variants of a common mental template. This is sexual identity as a psychological and almost caricatured reality and not as a biological one. Thus, the terms 'gender recognition' and 'gender discrimination' are the ones most often used in this field of research.

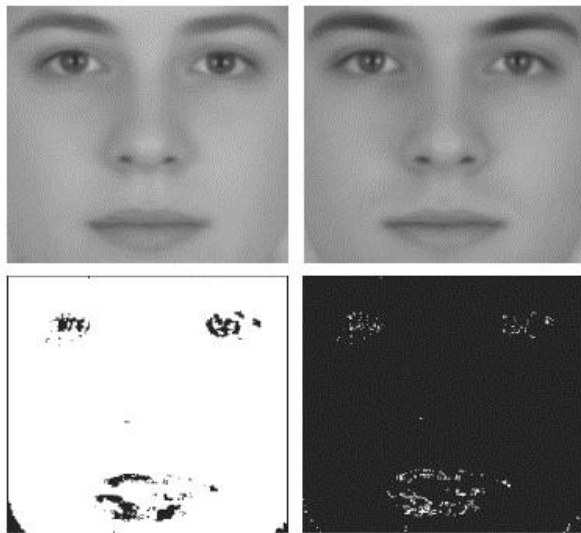
To recognize an object as a human face, the face-recognition module targets certain features like the eyes and the mouth (Pascalis & Kelly,

2008). Another key feature is skin color, specifically hue and luminosity, which seem especially crucial to telling male and female faces apart. In terms of hue, a male face is browner and ruddier than a female one because melanin and blood are more present in the skin's outer tissues (Edwards & Duntley, 1939). In terms of luminosity, a female face has higher contrast between the skin and the lips or eyes (Dupuis-Roy et al., 2009; Russell, 2003). Hue provides a fast visual channel for gender recognition (Dupuis-Roy et al., 2009; Nestor & Tarr, 2008a; Nestor & Tarr, 2008b; Tarr et al., 2001; Tarr, Rossion, & Doerschner, 2002). If the observer is too far away or the lighting too dim, the brain switches to the slower but more

accurate luminosity channel (Dupuis-Roy et al., 2009).

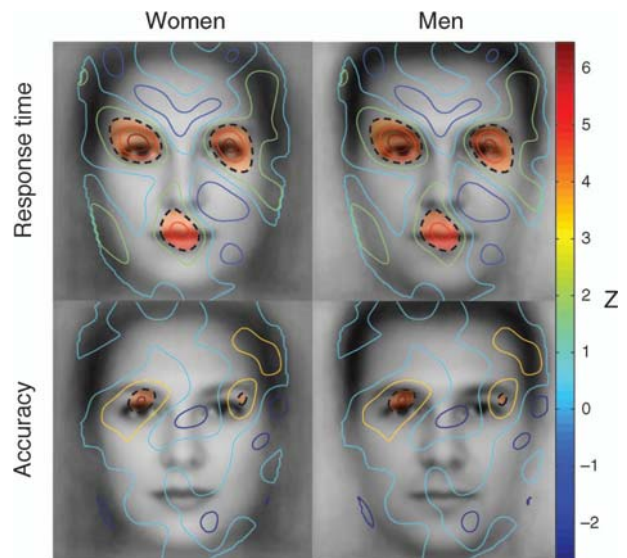
Skin color seems more crucial to gender recognition than other features, including face shape (Bruce & Langton, 1994; Hill, Bruce, & Akamatsu, 1995; Russell & Sinha, 2007; Russell et al., 2006; Tarr et al., 2001; Tarr, Rossion, & Doerschner, 2002). When shown a human face, subjects can tell its gender even if the image is blurred and differs only in color (Tarr et al., 2001). This gender cue may explain the similar evolution of female cosmetics in a wide range of culture areas, i.e., women generally seek to lighten their facial color and to increase its contrast with their lip and eye color (Russell, 2003; Russell, 2009; Russell, 2010).

**Figure 1.** Averaged female face (left) and averaged male face (right) (White American subjects with no makeup).



**Note.** Female faces are lighter-skinned than male faces, while showing more contrast between facial skin and lips/eyes. **Upper Left:** Average of 22 female faces; **Upper Right:** Average of 22 male faces; **Lower Left:** White pixels are where the female average is lighter than the male average; **Lower Right:** White pixels are where the male average is lighter than the female average (From Russell, 2010).

**Figure 2.** Averaged female face (left) and averaged male face (right) (French Canadian subjects with no makeup).



**Note.** The key facial regions for gender recognition, in terms of either response time or accuracy, seem to be where facial skin borders the lips or the eyes (From Dupuis-Roy et al., 2009).

## Origins of Male and Female Skin Pigmentation: Interactions between Age and Sex

### *Lighter Skin as a Mark of Infancy*

Humans are born with little skin pigmentation (Grande et al., 1994; Kahlon, 1976; Walsh, 1964). This pallor is striking in dark-skinned populations, who consider it a mark of infancy. In Kenya, newborn infants are often called *mzungu* ('European' in Swahili), and a new mother may ask her neighbors to come and see her *mzungu* (Walentowitz, 2008). Among the Tuareg, children are said to be born "white" because of the freshness and moisture of the womb (Walentowitz, 2008). According to Zahan (1974), the cause is often thought to be a previous spiritual life:

There is a rather widespread concept in Black Africa, according to which human beings, before "coming" into this world, dwell in heaven, where they are white. For, heaven itself is white and all the beings dwelling there are also white. Therefore the whiter a child is at birth, the more splendid it is. In other words, at that particular moment in a person's life, special importance is attached to the whiteness of his colour, which is endowed with exceptional qualities. (Zahan, 1974, p. 385)

Another Africanist makes the same point: "black is thus the color of maturity [...] White on the other hand is a sign of the before-life and the after-life: the African newborn is light-skinned and the color of mourning is white kaolin" (Maertens, 1978, p. 41).

This infant coloration is phylogenetically old. Nonhuman primate infants differ from adults mainly in coat color, but skin color also differs visibly. This is particularly so with langurs, baboons, and macaques, their skin being pink in newborns and almost black in adults. Be it on skin or fur, natal coloration seems to modify adult behavior in the direction of more caregiving and less aggression (Alley, 1980; Blaffer-Hrdy, 2000, pp. 446-448; Jay, 1962).

### *Lighter Skin as a Mark of Womanhood*

After birth, the skin darkens in both sexes until just before puberty, when girls are slightly darker than boys. Both sexes then lighten in color, but the lightening trend is stronger in girls. This trend begins to level off in late adolescence, and the resulting sex difference persists into adulthood although it may fade away after 40 years of age (Frost, 2007; Kahlon, 1976; Kalla, 1973; Mazess, 1967; Mesa, 1983; van den Berghe & Frost, 1986).

This sex difference varies not only by age but also by body site, being greater on body sites where women have thick deposits of subcutaneous fat (buttocks, breasts, hips). Since skin color is usually measured under the arm to minimize tanning, the degree of sexual dimorphism has been systematically underestimated (Frost, 2010, pp. 118-119). This sex difference also varies by population, being greater in populations of medium skin color and smaller in those with very light or very dark skin (Frost, 2007; Madrigal & Kelly, 2007). Finally, men and women differ not only in constitutive pigmentation, i.e., color of untanned skin, but also in tanning capacity. This facultative sex difference was demonstrated by a New Guinea study that measured unexposed skin color on the upper inner arm, exposed skin color on the forearm, and time spent in the sun. Despite identical sun exposure, the men were darker than the women, and more so on exposed skin (Harvey, 1985). The same finding emerged in another New Guinea study, whose author ruled out the possibility that the women were less exposed to the sun: "as in most parts of New Guinea the adult females are responsible for most of the food cultivation and are therefore exposed almost continuously to sunlight" (Walsh, 1964).

Several lines of evidence point to an innate cause. A Japanese twin study concluded that genetic factors were largely responsible for pubertal lightening of female skin (Omoto, 1965). This was also the conclusion of a year-by-

year skin-reflectance study of Tibetan boys and girls at a refugee boarding school who wore the same kind of uniform, had the same activities, and were examined in December and January, when tanning is minimal (Kalla & Tiwari, 1970). A 'digit ratio' study on English subjects found that lighter skin in women correlates with higher levels of prenatal estrogen (Manning, Bundred, & Mather, 2004). A skin-reflectance study on Black Bahamian subjects found that lighter skin in women correlates with thicker subcutaneous fat (Mazess, 1967). Finally, the sex difference in skin color is partly eliminated by castration and ovariectomy, an indication that the sex hormones contribute to this dimorphism not only at a prenatal stage but also later in life (Edwards & Duntley, 1949; Edwards et al., 1941).

This sexual dimorphism has no true antecedents in nonhuman primates. But there is an analogous dimorphism. In seven of the eight primate species where adult males and females differ in coat color, the sex difference results from the female retaining the infant's lighter coloration. Interestingly, five of the seven (63%) are monogamous, even though monogamy prevails in only 18% of all primate species (Blaffer-Hrdy & Hartung, 1979). This apparent infantile mimicry may be a female adaptation to the social environment of monogamy, specifically vulnerability to male neglect (because male provisioning is more necessary) and male aggression (because cohabitation lasts longer and is more continuous). To reduce these risks, the female may mimic key infant features to inhibit aggressive impulses in her mate and to stimulate feelings of care (Blaffer-Hrdy, 2000, pp. 444-451). It is perhaps for similar reasons that much of mammalian sexuality seems to come from infant behaviors, e.g., cuddling, murmuring, nipple sucking, and mouth licking (Wickler, 1973, pp. 163-185).

## Function of Women's Lighter Skin

What use is lighter skin for women? There are three hypotheses:

*Infantile mimicry?* A fairer color is one of several noticeable features that characterize the human infant, others being a 'baby face,' smooth hairless skin, and a higher pitch of voice. As identifiers of a vulnerable life stage, these features eventually acquired the property of making an observer less aggressive and more willing to provide care. Finally, the adult female body adopted them to influence male observers in the same way (Blaffer-Hrdy, 2000, p. 445; Frost, 1988; Guthrie, 1970; van den Berghe & Frost, 1986).

*Signal of fecundability?* Through a fortuitous interaction between pigmentation and the sex hormones, fairer skin became a means to assess a potential partner's fecundability. Girls lighten in color after puberty and, later, women tend to darken during pregnancy, as well as slightly during the nonfertile phase of the menstrual cycle (Symons, 1995; van den Berghe & Frost, 1986).

*Facilitator of vitamin-D production?* Natural selection lightened women's skin to increase vitamin-D production, thereby ensuring enough calcium and phosphorus during pregnancy and breastfeeding (Jablonski & Chaplin, 2000).

These three hypotheses are not necessarily incompatible. Once men and women had visibly differentiated in skin color, for whatever reason, this sex difference would have become a mark of sexual identity. Men would have tended to choose female mates with an unambiguously feminine appearance, and women male mates with an unambiguously masculine appearance, thereby accentuating the initial sex difference through sexual selection. At that point, skin color would have become an index of reproductive health, indicating one's respective degree of feminization or masculinization.

This sex difference in skin color remained highly visible in the social environment as long as ethnic differences remained less so. Thus, wherever the visual arts developed, in regions as far apart as Egypt, Japan, and Meso-America, artists gave a lighter complexion to female figures than to male figures (Capart, 1905, pp. 26-27; Eaverly, 1999; Soustelle, 1970, p. 130; Wagatsuma, 1967).

Today, women's lighter complexion has become much less noticeable in an increasingly multiethnic context. Gendering of skin color has also blurred since the 1920s, when women began to embrace the suntanned look (Segrave, 2005). When I surveyed university students in Quebec City about this sex difference, I found that only a quarter of them were aware of its existence (Frost, 1987, pp. 104-109).

### Earlier Meanings

Yet our ancestors were very much aware. Before their continent opened up to the world five centuries ago, Europeans described skin color with reference to the complexions they saw among themselves. 'White,' 'brown,' and 'black' corresponded to what we now call light, tan, and dark. Again contrary to current usage, these gradations identified individuals rather than ethnic groups. A white was a lighter-skinned person and a black a darker-skinned one. This way of seeing things persists in family names that once referred to skin-color gradations within a single population, like White, Brown, and Black among the English, Leblanc, Lebrun, and Lenoir among the French, or Weiss, Braun, and Schwartz among the Germans (Frost, 1990).

This narrow spectrum was conducive to gendering of skin color. A woman had to be fairer than average, i.e., 'white' in Europe or East Asia, 'golden' in South-East Asia, and 'red' in sub-Saharan Africa. Despite being normative for women, a fairer skin did not monopolize all erotic male desires. In old European folklore, some desires could target

darker women, i.e., the nut-brown maid of the English, the *braunes* or *schwarzbraunes Mädel* of the Germans, the *brune* of the French, or the *barna kislány* of the Hungarians. This type of eroticism was ardent, but also stormy and short-lived (Carpenter, 1936; Massny, 1937; Vasvari, 1999).

Conversely, a man had to be darker than average, although attitudes on this point were somewhat ambivalent. A man was handsome if fair, but virile and strong if brown. In medieval England, the tenth token of a knight of 'strong Corage' required a 'broun coloure in al the body', a quality that many vaunted by adding 'the brown' to their names (Curry 1916, pp. 80-95).

This male/female distinction, as well as the adult/infant distinction, dominated the social meaning of skin color in the earliest human societies, notably hunter-gatherers and simple horticulturalists. Lighter skin thus signified femininity but not higher status among the hunter-gatherers of the Nicobar Islands:

Headmen and their families do not differ from the rest of the community in respect to colour; their position is due to superior intelligence and not to the mere accident of birth [...] the lighter coloured skins are, however, very generally preferred, and I have known a woman who was admiringly described as the "white widow," whose face proved nevertheless to be several shades darker than that of an ordinary Chinaman. (Man, 1889)

This was also the case among horticultural peoples like the Ibo of Nigeria:

From this body of definitely expressed opinion the equation of paleness of complexion with beauty emerges quite clearly. Divergence never occurs on this issue. In assessing the effect of the European standard it should be borne in mind that the Ibo population is almost entirely free from half-castes, and thus there is no gradual transition between the Negro and European stocks. There can therefore be no "passing." Secondly, paler pigmentation has no class

significance. Wealthy Ibo are of all shades of complexion. (Ardener, 1954)

With increasing class stratification came a growing association between lighter skin and higher status. Such "pigmentocracies" arose partly because the socially dominant were generally landowners whose untanned skin visibly set them apart from the peasants, serfs, or slaves who worked the soil. Another reason, no less important, was the tendency of higher-ranking men to marry the prettiest and fairest-skinned women. Over time, this sexual selection would lighten the mean skin color of the upper classes, as in India:

Wealthy landowning families often have a tradition of seeking light-skinned brides among poorer members of their subcaste. It is very common to find a high concentration of lighter-skinned people among established land-owning families. (Béteille, 1967)

This also seems to have been true in Japan. A study of unexposed skin showed that upper-class Japanese were less pigmented than lower-class Japanese, even when the latter worked indoors in factories and not outdoors on farms. The likeliest explanation is that the upper-class men had a wider range of prospective brides and could thus select the fairest ones, for "skin color has long been regarded, by the Japanese, as one of the criteria for evaluating physical attractiveness, especially in young females" (Hulse, 1967).

### **Sexual Attraction and Other Tasks**

Gender recognition is not the only mental task that involves observing a person's facial skin and measuring its hue and luminosity. There is also sexual attraction, although this task involves many non-visual inputs (hormonal state, personal history, social and physical context, nature of the sexual relationship, etc.). The sex hormones in particular seem to exert an interacting influence, at least on women. This

was the finding of a study where young women were presented with pairs of facial photos: three pairs of female faces and three pairs of male faces. Each pair was identical except for a slight difference in skin luminosity, and the female participant had to choose the face she liked the most. The choices, as it turned out, varied with the phase of the menstrual cycle. The darker male face was more strongly preferred by participants in the first two-thirds of the cycle (when estrogen levels are high in relation to progesterone levels) than by those in the last third (when estrogen levels are low in relation to progesterone levels). Menstrual cycle phase did not affect face preference if the two faces were female or if the participants were taking oral contraceptives (Frost, 1994).

A similar cyclical effect modulates sexual attraction to other secondary sexual characteristics, like face shape and body odor. Although women generally prefer men with a more feminine face shape, i.e., smaller nose and less protuberant chin, this preference reverses during the nine days before ovulation (between days 5 and 14 of a 28-day cycle) when estrogen is at its highest and progesterone at its lowest (Danel & Pawlowski, 2006; Johnston et al., 2001). Women likewise lose their dislike for the smell of androstenone, the main component of male body odor, between days 6 and 14 of the menstrual cycle (Grammer, 1993).

Skin color may also influence the way an observer assesses certain personal qualities. This phenomenon has particularly interested researchers in child development, their aim almost always being to understand how children learn race prejudice. One exception is a research team led by two American psychologists, Deborah Best and John Williams, who argue that all humans have an early developing tendency to prefer lighter skin. They came to this conclusion after studying young European or Japanese children who were unfamiliar with darker-colored ethnic groups. When shown pictures of people or

animals, the children associated lighter skin with positive words, i.e., 'clean', 'pretty', and 'nice', and darker skin with negative words, i.e., 'dirty', 'ugly', and 'nasty' (Best, Field, & Williams, 1976; Best, Naylor, & Williams, 1975; Iwawaki et al., 1978; Munitz, Priel, & Henik, 1987). These associations were not acquired progressively with increasing age, i.e., on a learning curve (Best, Naylor, & Williams, 1975; Munitz, Priel, & Henik, 1987). Nor did the rate of acquisition correlate with the child's IQ, as would be the case if the associations were learned (Williams, Boswell, & Best, 1975; Williams et al., 1975; Williams & Rousseau, 1971).

But does lighter skin necessarily evoke positive qualities and darker skin negative qualities? When a translation error resulted in the children being given the word 'robust', they associated this positive quality with darker skin (Best, Naylor, & Williams, 1975). It appears that the researchers had unwittingly chosen words that evoke not only positive or negative qualities but also feminine or masculine ones.

## Conclusion

These different studies point to the existence of a mental module that serves not only to recognize the human face but also to identify its gender by means of sexually dimorphic features, particularly the hue and luminosity of facial skin. This module seems to operate differently in men and women under the influence of hormonal inputs, i.e., the body's ratio of estrogens to anti-estrogens (androgens or progesterone). In addition to assisting gender recognition, the resulting output may also alter the observer's mental state in a number of areas, ranging from sexual attraction to emotional distancing.

Face recognition has recently been studied by a team of Chinese researchers, who concluded that it takes place within a distinct heritable module of the brain and is not simply an aspect of general mental ability (Zhu et al., 2009). This

was a major study with many participants but it proved in several months what had been suspected for several decades. The same approach may show whether this module also processes visual information on the skin's hue and luminosity.

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# Open Peer Commentaries

## Commentary on Steklis & Steklis (2011): *Graduate Interdisciplinary Programs for Training Students in Human Behavior, Evolution, and Development*

By **Frank Salter**

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The most direct way to begin this comment is by responding to the questions posed by H. Dieter Steklis and Netzin G. Steklis (2011; hereafter S&S) at the end of their article.

- I hope that the advances described in the paper, especially regarding epigenetics of behavior, will allow new multidisciplinary initiatives. The examples lie outside my expertise, but it seems we are faced with the happy prospect of answering a new set of research questions using new theory and techniques.
- A formalized Graduate Interdisciplinary Program (GIDP) is certainly worth a try.
- Being the recipient of a cross-disciplinary doctorate (in political ethology) 20 years ago it is my experience that GIDP graduates will find it difficult to find placement in traditional departments. The same applies to many students who specialize in human ethology. Where are the jobs for them? I recommend making the negotiation of opportunities for graduates an integral part of the project.
- Regarding the name of the program, it might well be that a neologism will fare better than "human ethology", at least for a while. However, there are costs associated with abandoning that name, mainly resulting from

the break with historical continuity. Ethology is a Nobel Prize-winning field with origins in 19<sup>th</sup> century naturalism and a rich tradition spanning many countries.

The remainder of my comments concerns the last point.

I see nothing in the target paper that necessarily lies outside the purview of human ethology. The difficulty with keeping a biological approach to studying behavior outside the big-tent of ethology is that the field is so broadly defined (by Irenäus Eibl-Eibesfeldt, 1989, p. 4). If human ethology is the biological study of human behavior – and not some particular theory or body of knowledge – then the GIDP is clearly an example of that integrative field. And in fact the field has long drawn on, and sometimes contributed to “Anthropology, Ecology and Evolutionary Biology, Family Studies and Human Development, and Psychology” (S&S, p. 33).

This claim remains true despite the validity of some of S&S’s criticisms. Yes, the limitations of what we knew about evolutionary mechanisms necessarily restricted the explanatory and heuristic power of ultimate theory until, say, the 1960s. But then sociobiology produced a surfeit of models that introduced a hypothesis-driven track of ethological research, still falling within the paradigm. Now we are learning that information can flow from the environment, including behavior, to the genes so as to alter their function. Even if this turns out to be a substantial flow compared to that in the genome-to-phenotype direction I don’t see that this new information falls outside ethology. It is a case of the biology of behavior.

The same is true of what I think is the most exciting new approach discussed by S&S, the realization of individual and group differences in adaptive strategies, “adaptive plasticity” (p. 30). Longstanding ethological theory, in which most of us were trained, derived from Darwin and Lorenz. This held that the interesting aspects of behavior are species typical or universal. Now we

are learning that the one species can contain many different individual and group adaptations. This is hardly news to psychologists or sociologists who have spent the last century documenting such differences, though usually not with an eye to adaptive function or the integration of other levels of causality. Although ethologists and many evolutionary psychologists might feel most comfortable with universals, venturing into the well-worn paths of other social sciences will not require giving them up or sacrificing any scientific principle. Studying different adaptive strategies does not abolish ethology but broaden its scope.

Despite all this, it is entirely reasonable to ask whether the name “human ethology” should be retained. The field is often understood to be relatively narrow – the tradition of methods and theories established by Lorenz, Tinbergen and von Frisch. Some social scientists have told me that ethology is all about imprinting. Moreover the name has been associated with controversies such as that between Lorenz and Lehrmann, discussed in the target article. If abandoning the title will help advance the substance of the science, then why not? One reason is that the debit is significant. I have already discussed the cost of breaking with the long and distinguished tradition of ethology, a tradition partially maintained by continuity of title. On the credit side the benefits might not be substantial. This becomes clear from consideration of the non-scientific causes of opposition to ethology and sociobiology, which are not fully described by S&S.

S&S are probably right that some critics have been concerned with what they saw as ethology’s determinism, meaning a theory that does not incorporate all causal factors. But theoretical differences are not sufficient to explain the frequent intemperance of the criticisms. Tempers were raised by territorial and status conflicts, some of which can be observed occurring between other disciplines and theoretical camps. There was also a pronounced political dimension. And this does not reduce to Konrad Lorenz being a Nazi Party member in the late 1930s because the growing leftism and minority sensibility of social

scientists caused them to start the process of rejecting biological approaches in the 1920s or earlier, beginning with the New Social Science led by John Dewey and Franz Boas (C. Degler, 1991, pp. 200-202; Ruse 1989, p. 203). As late as the 1980s some of the most passionate opposition to sociobiology, for example, was ideologically inspired, such as by S. J. Gould (1981) and S. Rose, R. Lewontin, and L. Kamin (1984). These attacks were not prompted by aversion to names such as ethology or sociobiology. In a way it was a boundary dispute, though the defended academic territory was defined by the hegemony of political values within it.

Now it is true that for various reasons opposition to ethological thinking is fading. This bodes well for initiatives such as the proposed GDP. Perhaps it is safe then to retain the 'E' word in its broad definition?

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## Book Reviews

### Beyond the Brain: How the Body Shapes the Mind

By **Louise Barrett**

Princeton University Press, 2011, 304 pp; ISBN 978-0-691-12644-9 [Hdbk, \$29.95]

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Over the past decade, the world-wide media has heralded stories about animal cognition with unprecedented fanfare. Almost daily, the general public is inundated with so-called "breakthrough discoveries" concerning here-to-fore unimaginable feats of mentation in species ranging from apes to crows. But, just in case you missed it, here's a sampling. Chimpanzees are hunting with spears (Pruetz & Bertolani, 2007), grieving over their dead (Anderson et al. 2010; Biro et al. 2010), fashioning sex toys (Tierney, 2010), filming documentaries of their own lives (Walker, 2010), imagining what each other are thinking (Schmelz & Tomasello, 2011), negotiating collective actions through offers and counter-offers (Melis, Hare & Tomasello 2009), and even making nests for sticks that they are pretending to be baby dolls (Kahlenberg & Wrangham, 2010). Meanwhile, orangutans are playing charades (Cartmill & Byrne, 2007), and suffering from self doubt (Suda-King, 2008), crows are validating Aesop's fables (Bird & Emery, 2009), scrub jays are engaging in espionage (Dally, Emery & Clayton, 2009), parrots are predicting their own demise ("Alex & Me", 2009), elephants are painting self-portraits ("Elephant 'self-portrait'", 2006), and gorillas are using sign language to emote about their difficult childhoods ("Michael's story", 2008). Viewed from a distance, one might be forgiven for mistaking Pierre Boullé's satiric tale, *Monkey*

Planet (Boulle, 1964) (*aka* Planet of the Apes) as a scientific documentary sent from the future. But are these upwardly ratcheting tales of animal cognition accurate and/or valid? Something doesn't add up. Comparative psychology -- a discipline which once offered the bright promise of defining what makes humans human -- seems on the brink of being reduced to a Vaudeville stage dedicated to performing sensationalistic skits about animal smarts.

Enter Louise Barrett's marvelous new book, *Beyond the Brain* -- an eleven-chaptered plea for psychologists to step back and regroup. As she puts it every dozen pages or so, it's time to temper the cognitive revolution and "put the brain in its place." But far from advocating a return to behaviorism, Barrett rides the wave of embodied cognition, leaning heavily on scholars ranging from James Gibson to Andy Clark, decrying the reification of perception, action and cognition as discrete entities. In a daring take-no-prisoners assault, she confronts head-on the metaphor of brain-as-computer that has been the mainstay of cognitive science since John von Neumann's revolutionary work on the ENAIC. From the stealthy predatory antics of *Portia* spiders to dancing T-shaped robots to crafty baboons, Barrett illustrates how the hard-and-fast distinctions between perception, action, and cognition that have shaped our assumptions about the mind, have misdirected us from the true wellspring of intelligence: the essential embeddedness of the animal in its environment.

Our default model of cognition, Barrett argues, is that the senses generate illusory perceptual images which, in turn, are fed into an internal cognitive system that operates on its storehouse of passive mental representations of the world -- a "disembodied" cognitive system whose job becomes one of analyzing data and then commanding the body in which it resides to perform intelligent actions. Marshalling one richly-described example after another, Barrett reveals that although such an architecture may be capable of roughly mimicking the behavior of animals some of the time, it is an unlikely candidate for a proper scientific understanding of

how organisms actually achieve their flexible feats of intelligence. It's not that brains are unimportant, Barrett stresses, but that much of the time they may work quite differently than the computer metaphor would have us believe.

In a particularly informative example, she examines how research with both real and robotic rats establishes the plausibility of the idea that rather than constructing much ballyhooed "mental maps" of their environment, the body and brains of these animals may instead be learning what they are doing each time an environmental feature is encountered and what actions they can execute. This illustrates one of Barrett's recurring themes: although we (as outside observers) can describe such information in the rat as a "map of the environment", from the rat's point of view it is better described as an elaborate action plan. Again, Barrett seeks not to discard the idea of mental representations altogether, but to view them in proper perspective. Perception, action and cognition are rarely (if ever) discrete "things" inside the organism: they co-occur, nestled inside each other in ways that demand a new language for capturing how intelligent behavior is generated. The most straight-forward message of this book might be put as such: "What nature has entangled in environment, and body and brain, let not psychologists split asunder."

But this book has a bigger message, and one that requires a mirror to fully appreciate. Barrett begins by noting that as human beings -- armed with the "representationally hungry" processes characteristic of language -- we can't help but anthropomorphize animals: it's part and parcel of the way human folk psychology works. And for the attuned reader, her deeper message builds steam from there. This human folk psychology, she argues, is almost equally misplaced when applied to ourselves. After all, the human animal, too, is embedded in an environment which allows much "cognition" to be situated in a diffuse, non-explicit fashion in the body and the "reliably recurring resources" present in the world: in the spatial configuration of our hands, the angle of our knees, the optic flow we experience, the

extended nervous system that flexibly joins and disjoins tools with our body schema.

Barrett encourages us to think broadly: consider the overworked bartender, who off-loads the memory demands of keeping track of her orders by lining up glasses of distinctive shapes as external sources of information for what really matters: the actions of mixing and delivering the right drink to her alcohol-craving patrons. Rather than immediately defaulting to the assumption that the human mind is an omniscient library of information wedded to an omniscient controller of action, Barrett corrals existing experimental and theoretical perspectives to show how action-oriented, dynamical, and soft-assembly perspectives can illuminate phenomenon as seemingly unrelated as how insects maintain a flight path along the surface of a wall to how babies learn to walk and reach for objects. She contends that such processes are rampant in human "cognition", relieving the necessity to create complex sets of disembodied brain representations that must then feed back into a completely separate motor system. Human cognition, too, is surely at least partly composed of highly efficient and intelligent systems in which explicit representations (e.g., of walking and reaching) are nowhere to be found.

But to my way of thinking, the bigger payoff is yet to come. By adopting this view of how much human behavior is not "controlled" by an "CPU", we are free to take a fresh look at how the higher-order, representationally-hungry processes that Barrett freely acknowledges are part of the human mind have been woven into our more anciently-evolved, fully-embodied processes (and, I believe, lower-order representations, as well) (Penn, Holyoak & Povinelli, 2008). In doing so, we can turn Barrett's favorite example of Antoni Gaudi on its head. True, rather than using complex mathematical equations to design his perfect compression-based cathedral arches, the pioneering Spanish architect off-loaded this work to photographs of sagging of strings. But even truer, it was a human mind that concocted the idea that a sagging piece of twine might be a good model for an arch in the first place. In the six

million years since our split with chimpanzees, their cognitive system has never discovered this method for building cathedrals, let alone the peculiar religious beliefs they house. It seems unlikely they will unearth any of that in the next six million years, either.

And so we can see Barrett's brave new book as a beacon to future generations of scientists who wish to investigate the particularly human niche in cognitive evolution. Perhaps unlike all other species, we stand bipedally as a complex mosaic of both mechanical, dynamical, embodied and lower-order representational processes, as well as more abstract forms of cognition that allow us to think and imagine in a higher-order, role-governed relational manner -- the kind of cognition that makes analogical and metaphorical thinking possible (Penn, Holyoak & Povinelli, 2008). It may well have been the evolution of such genuinely "disembodied" cognitive operations that gave us a leg up over the more primitive embodied and lower-order representational systems stitched into us from our evolutionary past. On this view, it was disembodied cognition that allowed humans to roll out the wheel, tame fire, and invent rule-governed games like checkers, chess, charades and *jeu de boules*, not to mention allowing Gaudi to plan how he would carry forth the sky-scraping completion of the *Sagrada Familia* long after his demise. And as Barrett notes, it is disembodied cognition that allows us to ask scientific questions about the mind in the first place. How ironic, then, that these may be the very dimensions of human cognition that blind us to the way the human "mind" really works most of this time -- and the way animal minds work all of the time.

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# 2011 ISHE Election Results

by Tom Alley, for the ISHE Board of Officers

All candidates ran unopposed and all votes were cast **FOR ALL NOMINEES**. We thank those members who took the time to vote for these important positions. Congratulations to our four winners:

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Karl Grammer, Ph.D.

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Elisabeth Oberzaucher, Ph.D.

John Richer, Ph.D.

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# Upcoming Conferences and Meetings

*Compiled by Iris Holzleitner*

## **Behavior Genetics Association**

*41st Annual Meeting*

**June 5-9, 2011, Newport, Rhode Island, USA**

[www.bga.org](http://www.bga.org)

## **Association for Research in Personality**

*2011 Meeting*

**June 16-18, 2011, Riverside, California, USA**

<http://www.personality-arp.org/registration2011.htm>

## **Evolution 2011**

*Joint annual meeting of the Society for the Study of Evolution, the Society of Systematic Biologists, and the American Society of Naturalists*

**June 17-21, 2011, Norman, Oklahoma, USA**

<http://www.evolution2011.ou.edu/>

## **Society for Behavioral Neuroendocrinology**

*15th Annual Meeting*

**June 24-25, 2011, Queretaro, Mexico**

[www.sbne.org](http://www.sbne.org)

## **American Society of Mammalogists**

*91st Annual Meeting*

**June 24-29, 2011, Portland, Oregon, USA**

[www.mammalsociety.org](http://www.mammalsociety.org)

## **Human Behavior and Evolution Society**

*23rd Annual Conference*

**June 29 – July 3, 2011, Montpellier, France**

<http://www.hbes2011.univ-montp2.fr/>

## **CogSci 2011**

*Annual Meeting of the Cognitive Science Society*

**July 20-23, 2011, Boston, Massachusetts, USA**

<http://cognitivesciencesociety.org/conference2011/index.html>

## **Behavior 2011**

*Joint Meeting of the Animal Behavior Society and the International Ethological Conference*

**July 25-30, 2011, Bloomington, Indiana, USA**

<http://www.indiana.edu/~behav11/>

## **Summer Institute in Human Ethology**

*Summer Institute of the International Society for Human Ethology*

**July 5-9, 2011, Prague, Bohemia, Czech Republic**

<http://www.ishe.org>

## **International Society for the Study of Individual Differences**

*Annual Meeting*

**July 25-28, 2011, London, England, UK**

<http://www.issid2011.com/>

## **American Psychological Association**

*119th Convention*

**August 4-7, 2011, Washington, DC, USA**

<http://www.apa.org/convention/index.aspx>

## **International Academy of Sex Research**

*Annual Meeting*

**August 10-13, 2011, Los Angeles, California, USA**

<http://www.iasr.org/node/21>

## **The Association for the Study of Animal Behaviour**

*Summer Conference 2011*

**August 18-19, 2011, St. Andrews, Scotland, UK**

<http://lalandlab.st-andrews.ac.uk/conference-asab/index.html>

## **American Anthropological Association**

*110th Annual Meeting*

**November 16-20, 2011, Montreal, Quebec, Canada**

<http://www.aaanet.org/meetings/>

## **Evolang IX**

*9th International Conference on the Evolution of Language*

**March 13-16, 2012, Kyoto, Japan**

<http://kyoto.evolang.org/>

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