SY-02 Nature, prehistory and the naturalistic fallacy

The Methodological and Ethical Architecture of Evolutionary Thinking

The endeavour to derive optimal norms for human social organization—how men and women, couples, families, and societies might best live together—frequently looks backward to human evolution and prehistory. The intuitive premise is that understanding the conditions under which the human body and brain evolved will reveal the structural parameters of human flourishing. However, this enterprise constitutes a methodological and ethical minefield. Translating biological descriptions of our ancestral past into social prescriptions for our present requires navigating a landscape heavily populated by logical fallacies, romanticized anthropological myths, and statistical misinterpretations.

At the epicentre of this challenge are two opposing logical errors that distort the application of evolutionary science to social policy: the naturalistic fallacy and the moralistic fallacy. The naturalistic fallacy, tracing its philosophical lineage to David Hume's "is-ought" problem (1739) and formally articulated in G.E. Moore's *Principia Ethica* (1903), occurs when one assumes that because a trait, behaviour, or arrangement is "natural" or evolved, it is inherently good, moral, or justified[1]. Evolutionary psychology (EP) is frequently accused of vulnerability to this fallacy, particularly when popular press coverage suggests that ancestral behaviours—ranging from male sexual coercion to rigid social hierarchies—carry a normative mandate simply because they possess an evolutionary logic[4]. As evolutionary biologists and ethicists rigorously maintain, demonstrating that lethal inter-group aggression or infidelity has deep evolutionary roots does not render such behaviours morally acceptable or socially desirable in the present[2].

Conversely, the moralistic fallacy, a concept formally introduced by microbiologist Bernard Davis in a 1978 issue of *Nature*, represents the inverse cognitive trap[8]. The moralistic fallacy is the assumption that because a trait or behaviour has socially undesirable or ethically uncomfortable consequences, it cannot naturally exist[8]. This fallacy frequently manifests in the preemptive rejection of robust scientific findings regarding genetic variance, sex differences, or innate predispositions toward tribalism and violence, driven by the fear that acknowledging such empirical realities will legitimize inequality or aggression[8]. An objective approach to human nature requires the rigorous decoupling of empirical reality from moral preference, accepting that nature is entirely indifferent to human ethical frameworks.

To bypass these fallacies and contextualize human behaviour, evolutionary theorists rely heavily on the concept of the Environment of Evolutionary Adaptedness (EEA). The EEA does not designate a specific time or geographic location; rather, it represents a statistical composite of the selection pressures that shaped a given adaptation over the Pleistocene epoch. Because modern, industrialized, sedentary environments differ radically from the EEA, humans frequently experience "mismatch theory"[4]. Mismatch theory posits that traits highly adaptive in

small, kin-based foraging bands—such as a strong neurochemical reward for consuming metabolically dense sugars, or acute tribalistic distinctions between in-groups and out-groups—become actively maladaptive in globalized, sedentary, calorie-abundant modern societies.

However, the EEA concept has faced significant criticism. Critics argue that human environments during the Pleistocene were characterized by immense climatic and ecological instability, rendering the idea of a single, static "ancestral environment" scientifically untenable. Consequently, human evolution is best characterized by "variability selection"—the selection for supreme behavioural plasticity and cultural adaptability rather than rigid, hard-coded instincts. Furthermore, discussions of the EEA often devolve into deeply entrenched anthropological myths: the Rousseauian myth of the "Noble Savage," which envisions prehistory as a peaceful, egalitarian Eden corrupted only by the advent of agriculture and capitalism, versus the Hobbesian myth of the "Nasty Savage," which envisions ancestral life as an unceasing, brutal war of all against all. Both myths serve modern political narratives rather than empirical truth, obfuscating the complex, highly variable reality of prehistoric human life.

Navigating the Divide: How Careful Authors Draw Lessons Without Prescribing

To understand how to utilize evolutionary data without falling victim to the naturalistic or moralistic fallacies, one must examine how the most rigorous thinkers in the field draw lessons without prescribing specific social arrangements. Careful authors separate the biological mechanism from the ethical mandate.

Sarah Blaffer Hrdy, an evolutionary anthropologist, fundamentally reshaped the understanding of human family structures through her work on cooperative breeding. Hrdy demonstrates that the extreme metabolic costs of raising large-brained, slow-developing human infants could not have been met by isolated nuclear families. Instead, humans evolved as cooperative breeders, relying heavily on "alloparents"—grandmothers, siblings, and extended kin networks. Crucially, Hrdy does not commit the naturalistic fallacy by prescribing that women *must* remain in multi-generational communes. Instead, she draws the lesson that the human infant is biologically wired to expect a network of reliable caregivers, and that isolating modern mothers in nuclear households runs contrary to our evolved psychology, thereby predicting high rates of maternal depression and burnout.

Robert Sapolsky, a neuroendocrinologist, emphasizes the extreme context-dependency of human biology. Sapolsky's extensive work on testosterone and cortisol reveals that hormones rarely *cause* behaviours in a deterministic vacuum. For instance, testosterone does not create aggression out of nothing; rather, it lowers the threshold for pre-existing behavioural tendencies that are rewarded by the local culture. If a culture rewards aggression with status, testosterone facilitates aggression. If a culture rewards generosity with status, testosterone facilitates generosity. Sapolsky teaches that understanding biology does not mean accepting inevitability; it means understanding the levers of plasticity.

Joseph Henrich focuses on gene-culture coevolution, arguing that cumulative culture is the primary driver of human genetic evolution. Henrich demonstrates that human nature is not a

static biological baseline upon which culture is merely painted. Instead, cultural innovations—such as the control of fire, cooking, and complex social norms—actively altered human digestive anatomy and brain structure. Henrich's lesson is that human beings are an essentially cultural species; our biological "nature" is designed to absorb and adapt to the localized cultural software of our specific communities.

Frans de Waal, an eminent primatologist, utilized comparative biology to dismantle the myth that humans are inherently and exclusively selfish. By demonstrating that the cognitive precursors of empathy, conflict resolution, and fairness exist in chimpanzees and bonobos, de Waal proved that morality is not a thin cultural veneer suppressing a brutal nature, but rather a deeply rooted biological capacity. Importantly, de Waal does not argue that humans should mimic bonobo social structures; rather, he establishes that both our capacity for profound violence and our capacity for profound empathy are equally "natural."

Christopher Boehm, a cultural anthropologist, tackled the origins of human egalitarianism. Boehm detailed how early human foraging bands maintained highly egalitarian structures not because humans lack innate dominance drives, but because they actively suppressed them. Through "reverse dominance hierarchies," weaker individuals banded together to use gossip, ridicule, ostracism, and occasionally assassination to prevent alpha males from monopolizing resources. Boehm's work demonstrates that egalitarianism is not a passive state of nature, but an active, politically maintained achievement that requires constant vigilance against our innate hierarchical tendencies.

Formulating Defensible Claims

Synthesizing the insights of these careful authors allows for the formulation of defensible claims regarding human social organization. To avoid ethical and logical fallacies, researchers must abandon deterministic, prescriptive language (e.g., "Men are naturally X, therefore society must be structured Y"). Instead, claims must be formulated conditionally and probabilistically: **"Given what we are, arrangement X interacting with environmental condition Y tends to produce outcome Z."**

To execute this rigorously, human nature must be analytically separated into three distinct but interacting layers: physiology, behaviour, and culture.

Layer 1: Physiology (Measurable Constraints)

The foundational layer of human nature consists of physiological and anatomical traits. These traits are physically measurable, highly heritable, and subject to direct genetic and endocrine influences. While human sexual dimorphism is moderate compared to other primates like gorillas, it is highly pronounced in specific domains, establishing biological constraints that cultures must navigate.

Sexual Dimorphism in Muscle Mass and Strength

The most profound physiological divergence between human males and females lies in upper-body strength and muscle mass[14]. Meta-analytic data and vast population surveys continually reaffirm the extent of this divergence. In a comprehensive review published in the *Archives of Sexual Behavior*, Lassek and Gaulin (2009) demonstrated that, on average, men possess approximately 61% to 65% more overall muscle mass than women, with upper-body

muscle mass exhibiting an even starker contrast (up to 80% more arm muscle)[14].
The standardized effect sizes for these physiological differences are exceptionally large. The sex difference in grip strength—a highly reliable proxy for overall upper-body strength—yields a Cohen's d of approximately 2.5[18]. In statistical terms, an effect size of $d = 2.5$ indicates a near-categorical physiological difference rather than a merely statistical one, meaning the average man is physically stronger than over 99% of women[15].
From an evolutionary standpoint, these dimorphic traits are hypothesized to be the direct result of intense, ancestral intra-sexual competition (male-male contest competition) and inter-sexual selection (female choice). To test this evolutionary hypothesis, Lidborg et al. (2022) published a massive meta-analysis in *eLife* examining the predictive power of sexually dimorphic traits on mating and reproductive outcomes[17]. Synthesizing 96 studies and 474 effect sizes across a sample size of $N =$, the researchers evaluated traits such as voice pitch, height, baseline testosterone, facial robustness, and strength/muscularity[17].
The meta-analysis revealed that while traits like voice pitch and height predicted mating success (number of partners) in modern industrialized societies, strength and muscularity were the *only* robust, consistent predictors of both mating success and actual reproductive success (number of offspring) across varied cultural contexts, including non-contracepting traditional societies[17]. This highly replicated finding strongly supports the hypothesis that male upper-body strength evolved primarily through mechanisms of sexual selection, providing a physiological substrate that inherently influences power dynamics in human social arrangements[17].

The Genetic Architecture of Human Traits

When addressing how physiological and physiological-behavioural traits are inherited, analysis must be rooted in modern behavioural genetics. Eric Turkheimer, in a landmark 2000 paper in *Current Directions in Psychological Science*, formalized the "Three Laws of Behavior Genetics": (1) All human behavioural traits are heritable; (2) The effect of being raised in the same family is smaller than the effect of genes; and (3) A substantial portion of the variation in complex human behavioural traits is not accounted for by the effects of genes or families[20].
More recently, driven by the advent of Genome-Wide Association Studies (GWAS), researchers have proposed a "Fourth Law of Behavior Genetics": *A typical human behavioural trait is associated with very many genetic variants, each of which accounts for a very small percentage of the behavioural variability*[20]. This polygenic reality serves as a powerful bulwark against biological determinism. While physiological structures (such as testosterone receptor density or muscle fibre type) are highly heritable, the genetic pathways leading to specific complex social behaviours are incredibly diffuse. Consequently, while physiological constraints are real, deterministic claims linking a single gene to a complex social outcome (e.g., discovering a "divorce gene," a "leadership gene," or a "warrior gene") are mathematically and scientifically invalid.

Physiological Trait	Standardized Effect Size / Metric	Empirical Source & Sample Data	Evolutionary Implication
Overall Muscle Mass	Males average 61-65% greater mass	Lassek & Gaulin (2009)[14]	Adaptation for male-male contest competition and resource acquisition.
Grip Strength (Upper Body)	Cohen's $d \approx 2.5$	Lassek & Gaulin (2009)[15]	Near-categorical dimorphism; the average male is stronger than >99% of females.
Predictors of Reproductive Success	Strength/muscularity solely predicts actual offspring count	Lidborg et al. (2022); $N =$; 96 studies[17]	Sexual selection heavily targeted physical formidability over other dimorphic traits like facial robustness.
Genetic Architecture	Polygenic (thousands of variants with $<$ effect)	Turkheimer (2000); Fourth Law of Behavior Genetics[20]	Invalidates deterministic "single-gene" theories for complex human social behaviours.

Layer 2: Behaviour (Statistical, Overlapping Distributions)

Moving from physiology to psychology and behaviour requires a fundamental epistemological shift: behavioural differences between populations or sexes are rarely categorical. Instead, they represent overlapping statistical distributions. The failure to distinguish between statistical averages and individual predictability is a primary catalyst for both the naturalistic and moralistic fallacies.

Averages vs. Individuals: The Gender Similarities Hypothesis

To empirically quantify the magnitude of behavioural differences between men and women, Janet Hyde (2005) published "The Gender Similarities Hypothesis" in the *American*

Psychologist[23]. Synthesizing data from 46 separate meta-analyses covering diverse psychological domains (cognitive abilities, communication styles, personality traits), Hyde demonstrated that males and females are remarkably similar on the vast majority of psychological variables[23].

Using Cohen's d to quantify effect sizes, Hyde found that 78% of reported psychological gender differences had an effect size of $d \leq 0.35$, falling into the "small" or "close-to-zero" range[23]. For example, modern differences in overall mathematical ability and verbal ability yield effect sizes approaching zero. The specific domains where moderate to large differences reliably replicated included motor performance (linking directly back to Layer 1 physiology), certain metrics of sociosexuality (e.g., attitudes toward casual sex), and physical aggression[23]. Because these behavioural distributions heavily overlap, predicting an *individual's* psychological profile based solely on their biological sex is a statistical error. However, even small average differences (e.g., a $d = 0.20$ difference in a specific trait) can result in massive disparities at the extreme tails of a statistical distribution (e.g., the top 1% or 0.1%). This tail-end phenomenon explains why certain highly competitive, status-driven, or violent environments may exhibit profound sex skews despite general population similarities.

The Aggression Controversy: Evolution vs. Social Roles

Aggression is perhaps the most heavily scrutinized and hotly debated behavioural trait in the human repertoire. Meta-analyses conducted by John Archer, published in *Psychological Bulletin* (2000) and *Review of General Psychology* (2004), map the empirical landscape of human aggression[25].

When assessing general, direct physical aggression (e.g., fighting with strangers or acquaintances), males consistently score higher than females across all sampled ages and cultures, yielding moderate to large standardized effect sizes ranging from $d = 0.33$ to 0.91 [26]. This discrepancy reliably peaks in young adulthood (ages 20 to 30), a demographic pattern that aligns perfectly with evolutionary models of intra-sexual competition, wherein young males take escalated risks to acquire status and mates during peak reproductive years[26].

However, the dynamics of intimate partner violence (IPV) present a deeply contested and highly nuanced picture. Archer's comprehensive meta-analyses of heterosexual IPV revealed that women were slightly more likely than men to initiate or use at least one act of physical aggression against a partner ($d = -0.05$)[25]. Conversely, dictated by the physiological dimorphism outlined in Layer 1, men were significantly more likely to inflict severe physical injury ($d = 0.15$), with 62% of those injured by a partner being women[25].

This data ignited fierce theoretical debate. Evolutionary psychologists argue that the greater male propensity for escalated, severe physical violence stems from deeply evolved mechanisms of sexual selection and mate guarding[27]. In stark contrast, Social Role Theorists (prominently Alice Eagly and Wendy Wood) argue that these behavioural differences are not

innate, but are the result of intense socialization into gender roles prescribed by societal patriarchal structures. Social Role Theory predicts that as societies achieve greater gender egalitarianism, sex differences in aggression should systematically diminish[27]. Empirical tests of these competing theories yield complex results; while cultural variables, socioeconomic security, and the rule of law strongly influence the absolute *rates* of violence in a society, the fundamental sex difference in the *severity* and *lethality* of physical aggression remains a robust, cross-culturally replicated phenomenon[26].

The Modularity of Mate Preferences

Human mate preference represents another deeply researched behavioural domain where evolutionary algorithms interact with cultural inputs. Foundational cross-cultural research in evolutionary psychology (e.g., David Buss, 1989) suggested universal adaptive patterns: women, facing the heavy biological costs of gestation and lactation, place a higher premium on a partner's ability to provide resources and protection. Men, facing uncertainty of paternity and limited by female reproductive capacity, place a higher premium on cues of fertility, specifically youth and physical attractiveness[31].

In a highly rigorous, large-scale replication published in *Psychological Science*, Walter et al. (2020) analyzed data from $N = 14,487$ participants across 45 countries to test whether these preferences reliably replicate, and crucially, whether they fluctuate based on macrosocial variables like gender equality and pathogen prevalence[32]. The study robustly replicated the universal baseline sex differences: men consistently preferred younger, attractive mates more than women did, and women consistently preferred older mates with good financial prospects more than men did[33].

However, the study simultaneously validated the profound impact of cultural modulation. As a society's gender equality index increased, both sexes tended to adjust their preferences, choosing mates closer to their own age[33]. Furthermore, sex ratios (the relative abundance of men to women in a localized mating market) profoundly shifted strategies. When one sex was abundant, the scarce sex capitalized on their market power, becoming significantly more demanding in their preferences for attractiveness and resources[32]. Thus, human mating behaviour is best understood not as a rigid biological script, but as an evolved psychological architecture that dynamically calibrates its priorities in response to shifting socio-ecological contexts.

The Neurobiology of In-Group Bias and Ethnocentrism

Behavioural tendencies regarding social organization and group cohesion present equally complex evolutionary legacies. Human evolutionary history as tribal foragers required intensive, high-risk cooperation within groups, alongside vigilance and defense against rival out-groups. The neurohormone oxytocin is widely celebrated in popular science as the "cuddle hormone," heralded for its role in maternal bonding, trust, and empathy. However, a landmark—albeit controversial—series of experiments by De Dreu et al. (2011), published in the *Proceedings of the National Academy of Sciences* (PNAS), illuminated the darker, evolutionary utility of this biology[35]. De Dreu's team administered intranasal oxytocin to participants engaged in economic and moral decision-making games. They found that while oxytocin administration

reliably increased in-group trust, cooperation, and self-sacrifice, it simultaneously and proportionally promoted human ethnocentrism, out-group derogation, and a willingness to preemptively strike out-group members in competitive scenarios[35].
(Note: The broader field of oxytocin administration research has faced replicability challenges due to frequently small sample sizes [often $N < 100$ per condition] and methodological nuances. However, the overarching theoretical finding—that human biological mechanisms for empathy and cooperation evolved under conditions of intense inter-group competition and are deeply tied to in-group boundaries—remains a robust paradigm in evolutionary psychology[36].)
This dynamic illustrates a critical lesson in avoiding the naturalistic fallacy: "natural" biological mechanisms (like empathy-inducing neurohormones) evolved to solve ancestral survival and reproductive problems, not to generate modern, universal moral paradigms.

Layer 3: Culture (Variable Expressions and Adaptations)

The third layer of human nature, culture, represents the diverse array of solutions humans have developed to survive and reproduce across vastly different ecologies. While constrained by physiology (Layer 1) and statistically guided by evolved behavioural psychology (Layer 2), human culture is uniquely flexible. Prehistory, anthropology, and genetic genealogy provide the empirical testing grounds for mapping the boundaries of this flexibility.

Social Networks and the Deep Roots of Hunter-Gatherer Cooperation

To understand the baseline of human social organization, researchers frequently study contemporary mobile forager bands, which serve as the closest available proxy for Pleistocene living conditions. Apicella et al. (2012) published a seminal paper in *Nature* mapping the complete social networks of the Hadza hunter-gatherers of Tanzania[38].
By charting the gift-giving and associative ties of the Hadza, Apicella's team found that hunter-gatherer social networks exhibit the exact same mathematical and structural properties—such as degree distribution, homophily, assortativity (the tendency for cooperative individuals to connect with other cooperative individuals), and clustering—as the social networks of modernized, industrialized populations mapped through digital platforms[40].
Furthermore, they observed that highly cooperative individuals tend to cluster together, effectively isolating defectors and free-riders to the margins of the network. This finding indicates that the fundamental architecture of human social networks, and the precise mechanisms by which humans sustain cooperation without formal legal institutions, are not modern inventions but ancient, structurally conserved features of human ecology[40].

The Cuckoldry Myth and Paternity Certainty

A persistent trope within the literature of evolutionary psychology is the "dual mating strategy" hypothesis. This theory posits that ancestral women routinely engaged in a split strategy: securing provisioning and paternal investment from a reliable, long-term social partner, while covertly seeking "good genes" (cues of formidability, symmetry, and immunocompetence) through extra-pair copulations (cuckoldry) with highly attractive, physically dominant men[42].
This hypothesis inherently assumes high rates of extra-pair paternity (EPP) in historical human

populations.
Recent methodological advances in genetic genealogy have allowed researchers to test this evolutionary claim empirically, utilizing vast archival datasets. Larmuseau et al. (2016, 2019), publishing in *Trends in Ecology & Evolution* and *Current Biology*, utilized robust Y-chromosome analyses paired with meticulously kept genealogical records spanning over 500 years in Western Europe (the Low Countries)[44].
The findings fundamentally disrupted the EP consensus: historical EPP rates were remarkably low, averaging only 1% to 2% per generation over the past five centuries, well before the advent of modern contraceptives[44]. Crucially, the researchers found that this low EPP rate was not entirely static; it modulated predictably based on socio-ecological and demographic variables. In tightly knit, rural farming communities subject to intense social surveillance, EPP hovered around 0.4%. Conversely, it peaked at approximately 5.9% among the lowest socioeconomic classes living in densely populated, highly anonymous, and rapidly urbanizing cities during the height of the Industrial Revolution[45].
These highly replicated, large-scale genetic findings deal a severe blow to the assumption that human females evolved to routinely cuckold partners as a primary reproductive strategy[43]. High potential costs associated with discovery—including infanticide, violent physical retaliation, complete withdrawal of paternal investment, and catastrophic reputational destruction—likely exerted overwhelming evolutionary pressure against extra-pair mating. Consequently, humans are best categorized as a species characterized by relatively high paternity certainty and intense, necessary biparental investment[42].

The Prehistoric Warfare Controversy

Perhaps the most fiercely contested issue regarding human prehistory is the prevalence, origin, and nature of inter-group warfare. Does human nature tilt toward the "noble savage" (innately peaceful, cooperative, and corrupted only by agriculture) or the "nasty savage" (characterized by endemic, lethal violence and tribal warfare)? The empirical evidence is deeply polarized, reflecting the methodological difficulty of interpreting the fragmentary archaeological record.
On one side of the debate, Samuel Bowles (2009) published a highly influential paper in *Science* analyzing archaeological and ethnographic data from Late Pleistocene and early Holocene populations. Bowles estimated exceptionally high mortality rates resulting directly from inter-group warfare. He utilized these mortality estimates to model how such intense, lethal between-group competition was the primary evolutionary driver for the emergence of human altruism; under his model, groups with high numbers of cooperative, self-sacrificing individuals outcompeted and annihilated groups of selfish individuals[46].
Conversely, Fry and Söderberg (2013), also publishing in *Science*, fundamentally challenged this paradigm. They re-examined the standard cross-cultural sample of 21 Mobile Forager Band Societies (MFBS)—the specific anthropological groups deemed most representative of ancestral, nomadic Pleistocene conditions[48]. Fry and Söderberg found a stark lack of evidence for organized, coalitional inter-group warfare. Out of 148 carefully documented lethal events, the vast majority were classified as interpersonal homicides or localized family feuds. Over half of the lethal events were perpetrated by lone individuals, typically driven by competition over a specific woman, retaliation for theft, or personal slights[48]. Fry and Söderberg concluded that

while interpersonal violence and murder have deep evolutionary roots, organized, coalitional *warfare* is largely a recent cultural artefact of agricultural, sedentary societies where accumulated resources, stored food, and hard territorial boundaries make raiding economically profitable[48].

This debate was further complicated by a 2016 *Nature* publication by Mirazón Lahr et al., detailing the discovery of a prehistoric massacre at Nataruk, Kenya, dated to approximately 9,500 to 10,500 BP (early Holocene). The researchers uncovered the remains of 27 individuals (including pregnant women and young children) abandoned in a lagoon. Ten of the twelve intact, articulated skeletons exhibited massive, lethal blunt-force and sharp-force trauma, including rare obsidian projectiles embedded directly in the bone[50]. Lahr et al. interpreted this site as undeniable proof of coalitional inter-group warfare among hunter-gatherers, arguing that the attacking group sought to annihilate the defenders to claim the highly fertile lagoon territory[50].

Critics of this interpretation, most notably Christopher Stojanowski, subsequently published rebuttals arguing that some of the skeletal trauma identified by Lahr might be taphonomic—caused by geological pressures and sediment compaction thousands of years after death and burial—rather than peri-mortem weapon trauma[53]. Lahr vehemently stands by the interpretation that the mass death event represents organized, lethal violence, citing the unburied state of the bodies and the embedded projectiles[53].

Synthesizing this literature reveals a nuanced, defensible reality: humans are not obligately peaceful, nor are they obligately warlike. Interpersonal homicide and spontaneous violence have deep evolutionary roots. However, large-scale, coalitional warfare likely emerges only under specific socio-ecological conditions—namely, localized population density, concentrated resource abundance (such as the fertile, un-depletable lagoon at Nataruk), and reduced mobility. When the violent acquisition of resources, women, and territory becomes highly profitable and fleeing becomes impossible, human culture rapidly adapts by institutionalizing warfare[51].

Warfare Paradigm	Empirical Source & Data	Key Argument	Implications for Human Nature
Endemic Warfare Model	Bowles (2009) *Science* [cite: 46, 47]	Pleistocene mortality was extremely high due to war.	War drove the evolution of in-group altruism and self-sacrifice.
Homicide over Warfare	Fry & Söderberg (2013) *Science*; 21 MFBS[48]	Lethal events mostly 1-on-1 homicides over women/slights.	War is an artefact of agriculture and sedentism, not innate.

The Nataruk Massacre	Lahr et al. (2016) *Nature*; 27 skeletons (10k BP)[50]	Unburied bodies with embedded obsidian and massive trauma.	Warfare existed among foragers when resources (lagoons) were abundant.
Taphonomic Critique	Stojanowski (2016) *Nature* rebuttal[53]	Trauma may be post-mortem geological crushing.	The archaeological record is highly fragile and open to over-interpretation.

Formulating Defensible Claims for Living Together

Given the immense complexity of physiology, behaviour, and culture, how can individuals, couples, families, and societies design functional ways of living together without committing logical fallacies?

The key lies in abandoning deterministic, prescriptive language and adopting conditional, probabilistic frameworks. Careful evolutionary thinkers formulate claims as follows: **"Given our evolved psychological architecture and physiological constraints, social arrangement X interacting with environmental condition Y tends to produce outcome Z."**

1. Acknowledging Physiology without Prescribing Roles:

It is an inescapable biological fact that women bear the absolute physiological costs of gestation and lactation, and that men possess massive average advantages in physical formidability and upper-body strength. A defensible claim recognizes that because of these baseline physiological asymmetries, achieving absolute 50/50 egalitarianism in specific physical labour domains, combat roles, or early-stage childcare may require substantial, intentional cultural scaffolding and institutional support to maintain. Stating this is not a moralistic fallacy; it is an objective acknowledgement of biological friction. Biology dictates the *cost* of a social arrangement, not its moral worth.

2. Structuring Environments for Desired Averages: If a society desires to reduce the rates of violent male-male competition and homicide, it must look to evolutionary ecology for structural solutions. Evolutionary theory robustly predicts that extreme resource inequality and highly skewed operational sex ratios (where a large percentage of lower-status men are frozen out of the mating market by elite resource monopolization) lead to steep discounting of the future and exponentially increased lethal violence[27]. Therefore, a defensible claim is: *Given the male psychological propensity for status-seeking and risk-taking, societies that implement progressive economic policies, robust social safety nets, and strict monogamous norms (which democratize mating access) will experience statistically lower rates of violent crime.* This utilizes biological understanding to achieve a deeply moral goal, without committing the naturalistic fallacy of claiming the biology itself is moral.

3. Harnessing and Overriding In-Group Psychology: Understanding that humans have a deeply evolved neurobiological propensity for ethnocentrism and in-group bias (as

demonstrated in oxytocin research)[36] means that large, multicultural societies cannot rely merely on "natural" human goodwill to maintain peace. Defensible policy requires actively expanding the psychological definition of the "in-group" through shared superordinate goals, powerful national identities, and institutional fairness. By doing so, culture effectively tricks our Pleistocene brains into viewing diverse neighbours as tribal kin.

Summary of Robust Findings

1. Upper-body strength is highly sexually dimorphic (yielding a massive effect size of $d \approx 2.5$) and is the strongest physical predictor of male mating and reproductive success cross-culturally, pointing to deep roots of male-male contest competition.
2. Behavioural sex differences in cognition and personality are remarkably small (78% of effect sizes fall at or below $d = 0.35$), meaning individual variability vastly outstrips average group differences.
3. Direct physical aggression is consistently higher in males ($d = 0.33$ to 0.91), predictably peaking in young adulthood in alignment with evolutionary theories of mating competition.
4. Intimate partner violence exhibits near-equal initiation rates between the sexes, but results in significantly higher injury and lethality rates inflicted by men due to baseline physiological formidability.
5. Mate preferences display universal sex differences (men prioritize youth/attractiveness; women prioritize resources/status), but these evolved preferences adaptively modulate based on local gender equality and sex ratios.
6. Historical extra-pair paternity (cuckoldry) was remarkably low (1% to 2%) in Western populations, empirically refuting claims that females routinely pursued evolutionary dual-mating strategies.
7. Hunter-gatherer social networks exhibit identical structural and mathematical properties to modern human networks, proving deep evolutionary roots for human cooperative architecture and assortative matching.
8. Prehistoric warfare was not a universal constant; while interpersonal homicide occurred in nomadic bands, organized warfare likely only emerged in tandem with resource concentration, reduced mobility, and population density.
9. Oxytocin and human empathy mechanisms are dual-edged, promoting intense in-group cooperation and self-sacrifice simultaneously alongside out-group derogation and ethnocentrism.
10. Complex human behaviours are entirely polygenic, meaning thousands of genetic variants each contribute minuscule effects; therefore, deterministic "single-gene" explanations for social behaviours are mathematically and scientifically invalid.

Contested or Open Questions

Domain	The Open Question	Theoretical Tension

Origins of IPV	Is intimate partner violence a direct evolutionary adaptation for mate guarding, or a maladaptive byproduct of broader male aggression operating within cultural patriarchy?	Sexual Selection Theory vs. Social Role Theory.
Hunter-Gatherer Warfare	Does the 10,000 BP massacre at Nataruk represent endemic prehistoric warfare, or a localized anomaly driven by rare resource abundance (the lagoon)?	Is warfare an innate human drive, or a purely cultural response to property and borders?
Oxytocin's Scope	Can the ethnocentric effects of oxytocin administration be reliably replicated in diverse, highly powered ($N > 500$) global samples?	The "replication crisis" in behavioural endocrinology vs. evolutionary models of bounded empathy.
The Gender Equality Paradox	Why do certain sex differences (e.g., occupational choices in STEM, personality traits) actually *increase* in the world's most egalitarian nations?	Do innate biological preferences manifest more strongly in free environments, or do new forms of cultural conditioning take hold?

Most Important Sources to Read in Full

1. **Hyde, J. S. (2005).** *The gender similarities hypothesis.* American Psychologist. (Essential for understanding overlapping statistical distributions and dismantling the myth of categorical psychological differences).
2. **Archer, J. (2004).** *Sex differences in aggression in real-world settings: A meta-analytic review.* Review of General Psychology. (The foundational meta-analysis mapping the complexities and context-dependency of human physical aggression).
3. **Walter, K. V., et al. (2020).** *Sex differences in mate preferences across 45 countries: A*

large-scale replication. Psychological Science. (The most rigorous, highly powered modern replication of human mating psychology, demonstrating gene-culture interaction).
4. **Lidborg, L. H., et al. (2022).** *A meta-analysis of the association between male dimorphism and fitness outcomes in humans*. eLife. (Authoritative data proving the evolutionary utility of muscle mass and physical strength over other dimorphic traits).
5. **Larmuseau, M. H. D., et al. (2019).** *A Historical-Genetic Reconstruction of Human Extra-Pair Paternity*. Current Biology. (Crucial for dismantling pervasive evolutionary myths about widespread ancestral cuckoldry using genetic genealogy).
6. **Lahr, M. M., et al. (2016).** *Inter-group violence among early Holocene hunter-gatherers of West Turkana, Kenya*. Nature. (A pivotal, highly controversial archaeological paper challenging assumptions about the peacefulness of pre-agricultural foragers).
7. **Fry, D. P., & Söderberg, P. (2013).** *Lethal aggression in mobile forager bands and implications for the origins of war*. Science. (The strongest empirical counter-argument to the idea of endemic prehistoric warfare, categorizing lethal events as individual homicides).
8. **Apicella, C. L., et al. (2012).** *Social networks and cooperation in hunter-gatherers*. Nature. (A fascinating empirical mapping of the deep evolutionary roots of human social ties and reputation-based cooperation).
9. **Turkheimer, E. (2000).** *Three Laws of Behavior Genetics and What They Mean*. Current Directions in Psychological Science. (The absolute essential primer for understanding how genetics actually influence behaviour probabilistically, not deterministically).
10. **Henrich, J. (2015).** *The Secret of Our Success*. Princeton University Press. (The foundational text on gene-culture coevolution, explaining how culture itself acts as the primary driver of human genetic adaptation).

Implications for living together

If natural does not mean good, what practical utility does evolutionary history hold for couples, families, organizations, and societies? The answer is that biology dictates the *frictional costs* of various social arrangements. Ignorance of human evolutionary psychology inevitably leads to the design of fragile institutions that fail catastrophically when they clash with fundamental human motivations.

For couples and families, understanding the evolutionary roots of jealousy, mate preferences, and the deep biological necessity of paternity certainty allows for a more compassionate, realistic approach to relationship maintenance. Acknowledging that the human brain did not evolve for perfect, effortless, lifelong monogamy in a modern environment saturated with supernormal stimuli (e.g., dating apps and digital anonymity) means that successful relationships require immense intentional effort, boundary-setting, and communication, rather than relying on a romanticized, culturally invented ideal of "natural" love. Furthermore, understanding our evolutionary legacy as cooperative breeders dictates that isolating nuclear families without extended social support networks is biologically unprecedented, directly contributing to modern crises of parental burnout.

For organizations and societies, understanding the dynamics of male intra-sexual competition

is vital for maintaining domestic peace. Because violent aggression and risk-taking are heavily concentrated among young males lacking status, resources, or mating prospects, societies must actively construct constructive avenues for status acquisition that benefit the group—such as education, trades, athletics, and economic mobility. A society that allows massive resource hoarding by elites while leaving young men disenfranchised is acting in direct defiance of human evolutionary ecology and will inevitably reap the violence that follows. Finally, recognizing our inherent, neurobiologically mediated tribalism and in-group bias means that diversity initiatives within organizations and societies cannot rely on moral platitudes. They must actively forge shared identities, emphasize common ground, and implement institutional fairness to successfully override our ancient biological software. Ultimately, humans are best served not by mimicking our prehistoric past, nor by pretending we have entirely transcended it, but by intelligently designing modern environments that acknowledge our deepest evolutionary drives while actively channelling them toward pro-social, flourishing outcomes.

Works cited

1. Bridging the Is Ought Divide - EvPhil Blog - Evolutionary Philosophy, https://www.evphil.com/blog/bridging-the-is-ought-divide
2. (PDF) Who's Afraid of the Naturalistic Fallacy? - ResearchGate, https://www.researchgate.net/publication/287952927_Who's_Afraid_of_the_Naturalistic_Fallacy
3. Who's Afraid of the Naturalistic Fallacy?, https://ora.ox.ac.uk/objects/uuid:0d06824a-a73e-4f2a-ad64-beada8339c69/files/m81ef69963060519eb7a812f52d23d4ab
4. What's the deal with evolutionary psychology controversy? - Reddit, https://www.reddit.com/r/AcademicPsychology/comments/1hyhxvx/whats_the_deal_with_evolutionary_psychology/
5. Exploring the Effects of the Naturalistic Fallacy: Evidence That, https://lemmalab.com/wp-content/uploads/2017/01/Ismail_naturalistic-fallacy_JASP-2012.pdf
6. Naturalistic Fallacy, The - ResearchGate, https://www.researchgate.net/publication/368715484_Naturalistic_Fallacy_The
7. On the inappropriate use of the naturalistic fallacy in evolutionary, https://www.researchgate.net/publication/226509912_On_the_inappropriate_use_of_the_naturalistic_fallacy_in_evolutionary_psychology
8. Moralistic fallacy - Wikipedia, https://en.wikipedia.org/wiki/Moralistic_fallacy
9. Moralistischer Fehlschluss - Wikipedia, https://de.wikipedia.org/wiki/Moralistischer_Fehlschluss
10. Moralistischer Fehlschluss - AnthroWiki, https://anthrowiki.at/Moralistischer_Fehlschluss
11. The Equality Paradox | Journal of Controversial Ideas, https://journalofcontroversialideas.org/download/article/6/1/316/pdf
12. (PDF) The Nature of Race: the Genealogy of the Concept and the, https://www.researchgate.net/publication/301293756_The_Nature_of_Race_the_Genealogy_of_the_Concept_and_the_Biological_Construct's_Contemporaneous_U

tility
13. (PDF) The Evolution of Morality and The Problem of AI Value Over, https://www.researchgate.net/publication/397130027_The_Evolution_of_Morality_and_The_Problem_of_AI_Value_Over-Alignment
14. Evolution and Human Behavior, https://digitalcommons.chapman.edu/cgi/viewcontent.cgi?article=1488&context=psychology_articles
15. Men's Bodily Attractiveness: Muscles as Fitness Indicators - PMC, https://pmc.ncbi.nlm.nih.gov/articles/PMC10480816/
16. Substantial but Misunderstood Human Sexual Dimorphism Results, https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.859931/pdf
17. A meta-analysis of the association between male dimorphism ... - eLife, https://elifesciences.org/articles/65031
18. interpersonal conflict through an evolutionary lens across three, https://rex.libraries.wsu.edu/view/pdfCoverPage?instCode=01ALLIANCE_WSU&filePid=13413273910001842&download=true
19. A meta-analysis of the association between male dimorphism and, https://pmc.ncbi.nlm.nih.gov/articles/PMC9106334/
20. (PDF) The Fourth Law of Behavior Genetics - ResearchGate, https://www.researchgate.net/publication/280941312_The_Fourth_Law_of_Behavior_Genetics
21. Three laws of behavior genetics and what they mean - OpenScholar, https://uva.theopenscholar.com/eric-turkheimer/publications/three-laws-behavior-genetics-and-what-they-mean
22. Three Laws of Behavior Genetics and What They Mean [The Human, http://humancond.org/papers/turkheimer00_three_laws_behavior_genetics
23. The Gender Similarities Hypothesis | Request PDF - ResearchGate, https://www.researchgate.net/publication/7589797_The_Gender_Similarities_Hypothesis
24. Janet Hyde - Google Scholar, https://scholar.google.com/citations?user=_d5DWq8AAAAJ&hl=en
25. Sex differences in aggression between heterosexual partners, https://pubmed.ncbi.nlm.nih.gov/10989615/
26. Sex Differences in Aggression in Real-World Settings - ResearchGate, https://www.researchgate.net/publication/45637197_Sex_Differences_in_Aggression_in_Real-World_Settings_A_Meta-Analytic_Review
27. Sex differences in adolescent physical aggression - PMC - NIH, https://pmc.ncbi.nlm.nih.gov/articles/PMC6950221/
28. Sex differences in adolescent physical aggression, https://dspace.library.uu.nl/server/api/core/bitstreams/767032b3-2735-4653-825e-ecbe47089f1e/content
29. Does sexual selection explain human sex differences in aggression?, https://knowledge.lancashire.ac.uk/id/eprint/1155/1/archer_J_does_sexual_selection_explain_2009.pdf

30. Sex Differences in Aggression between Heterosexual Partners, https://www.researchgate.net/publication/12332749_Sex_Differences_in_Aggression_between_Heterosexual_Partners_A_Meta-Analytic_Review
31. *Deconfounding Sex and Sex of Partner in Mate-Preference Research, https://pmc.ncbi.nlm.nih.gov/articles/PMC13428870/
32. (PDF) Sex differences in human mate preferences vary across sex, https://www.researchgate.net/publication/355778388_Sex_differences_in_human_mate_preferences_vary_across_sex_ratios
33. (PDF) Sex Differences in Mate Preferences Across 45 Countries, https://www.researchgate.net/publication/340068405_Sex_Differences_in_Mate_Preferences_Across_45_Countries_A_Large-Scale_Replication
34. Exploring Attitudes Toward “Sugar Relationships” Across 87 Countries, https://pmc.ncbi.nlm.nih.gov/articles/PMC10844470/
35. Oxytocin Effect on Collective Decision Making - PMC - NIH, https://pmc.ncbi.nlm.nih.gov/articles/PMC4829266/
36. A neurobiological association of revenge propensity during ... - eLife, https://elifesciences.org/articles/52014
37. Oxytocin Modulates the Cognitive Appraisal of the Own and Others, https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2019.00714/full
38. Social networks and cooperation in hunter-gatherers - PubMed - NIH, https://pubmed.ncbi.nlm.nih.gov/22281599/
39. Social networks and cooperation in hunter-gatherers, https://greatergood.berkeley.edu/images/uploads/Apicella-CooperationHunterGatherers.pdf
40. Spreading of cooperative behaviour across interdependent groups, https://arxiv.org/html/1310.4166v1
41. Coren Apicella - UPenn Psychology - University of Pennsylvania, https://psychology.sas.upenn.edu/people/coren-apicella
42. (PDF) Cuckolded Fathers Rare in Human Populations - ResearchGate, https://www.researchgate.net/publication/299839892_Cuckolded_Fathers_Rare_in_Human_Populations
43. Genetic-genealogy approach reveals low rate of extrapair paternity, https://www.researchgate.net/publication/318685386_Genetic-genealogy_approach_reveals_low_rate_of_extrapair_paternity_in_historical_Dutch_populations
44. Long-term Trends in Human Extra-Pair Paternity: Increased Infidelity, https://www.researchgate.net/publication/305495614_Long-term_Trends_in_Human_Extra-Pair_Paternity_Increased_Infidelity_or_Adaptive_Strategy_A_Reply_to_Harris
45. A Historical-Genetic Reconstruction of Human Extra-Pair Paternity, https://bio.kuleuven.be/eeb/tw/pdfs/larmuseau-etal-currbiol-2019.pdf
46. (PDF) Did Warfare Among Ancestral Hunter-Gatherers Affect the, https://www.researchgate.net/publication/26268380_Did_Warfare_Among_Ancestral_Hunter-Gatherers_Affect_the_Evolution_of_Human_Social_Behaviors
47. Did Warfare Among Ancestral Hunter-Gatherers Affect the Evolution,

https://eldar.cz/cognition/bowles_ulam_lectures_2008/warfare.htm
48. (PDF) Lethal Aggression in Mobile Forager Bands and Implications, https://www.researchgate.net/publication/250920560_Lethal_Aggression_in_Mobile_Forager_Bands_and_Implications_for_the_Origins_of_War
49. The Psychology of War, https://www.psychologytoday.com/us/blog/out-the-darkness/201403/the-psychology-war
50. Inter-Group Violence among Early Holocene Hunter-Gatherers of, https://www.researchgate.net/publication/291378615_Inter-Group_Violence_among_Early_Holocene_Hunter-Gatherers_of_West_Turkana_Kenya
51. Evidence of a prehistoric massacre extends the history of warfare, https://www.sciencedaily.com/releases/2016/01/160120141518.htm
52. Inter-group violence among early Holocene hunter-gatherers of, https://pubmed.ncbi.nlm.nih.gov/26791728/
53. Nataruk - Wikipedia, https://en.wikipedia.org/wiki/Nataruk
54. prehistory of violence and war: Moving beyond the Hobbes, https://academic.oup.com/jpr/article/60/4/720/8364900
55. Discoveries at Nataruk - In Africa, https://in-africa.org/discoveries-at-nataruk/
56. A Prehistoric Massacre in Africa Suggests that the State of Nature, http://darwinianconservatism.blogspot.com/2016/01/a-prehistoric-massacre-in-africa.html