PS-01 Sex differences in personality, interests and values

Introduction: A Tripartite Framework for Psychological Sex Differences

The study of psychological sex differences is an exceptionally complex domain within the behavioral sciences, situated at the nexus of evolutionary biology, differential psychology, and sociology. Historically, this field has been plagued by false dichotomies, pitting biological determinism against social constructionism. To evaluate the empirical literature rigorously and objectively, the analysis must be structured through a tripartite framework that acknowledges the continuous interaction between the organism and its environment.

The first layer of this framework is physiology. This foundational level encompasses measurable biological mechanisms, including genetic architecture, dimorphic neurological development, and the organizational effects of prenatal and pubertal hormones. The second layer is behaviour. This encompasses the statistical patterns of human personality, cognitive styles, vocational interests, and motivational values. At this level, sex differences are not binary or categorical; rather, they are characterized by overlapping distributions and are quantified via standardized multivariate and univariate effect sizes (e.g., Cohen's d and Mahalanobis D).

The third layer is culture. This represents the highly variable socio-ecological environment, including macroeconomic structures, pathogen prevalence, and gender role socialization, which can amplify, suppress, or redirect the phenotypic expression of underlying biological dispositions.

By distinguishing these three layers, it becomes possible to synthesize the vast corpus of primary literature, systematic reviews, and meta-analyses. What emerges is a highly nuanced, globally replicated map of human psychological dimorphism, revealing how evolutionary pressures have sculpted distinct, yet heavily overlapping, psychological profiles for men and women.

Layer 1: Physiology and Developmental Onset

The physiological foundation of psychological sex differences is heavily influenced by the organizational effects of gonadal steroid hormones during critical periods of fetal development. Evolutionary neurobiology posits that while human males and females faced identical survival challenges (e.g., avoiding predation, securing food), they faced distinctly asymmetric reproductive challenges and intrasexual competitive pressures over deep evolutionary time. This asymmetry led to dimorphic neural organization, primarily driven by fetal testosterone (fT) exposure in utero.

Prenatal Androgen Exposure and Brain Organization

Direct measurement of fT in humans is methodologically challenging and ethically restricted, typically relying on amniotic fluid sampled during routine second-trimester amniocentesis. In a

foundational longitudinal study published in *Infant Behavior and Development*, Lutchmaya, Baron-Cohen, and Raggatt (2002) demonstrated that amniotic fT levels are inversely correlated with the frequency of eye contact in 12-month-old infants[1]. Following these same cohorts, researchers found that higher fT levels negatively predicted vocabulary size in toddlers and positively predicted the manifestation of early restricted interests by age four[2].

The developmental trajectory of these early hormonal influences extends well into childhood. Auyeung, Baron-Cohen, and colleagues (2009), publishing in the *British Journal of Psychology*, tracked 235 children aged 6 to 10 years, revealing that amniotic fT levels positively and significantly predicted scores on the Childhood Autism Spectrum Test (CAST) and the Child Autism Spectrum Quotient (AQ-Child)[4]. Crucially, this dose-response relationship was observed within each sex as well as when the sexes were combined. This suggests that the androgenic mechanism operates on a biological continuum, continuously masculinizing neural architecture independent of chromosomal sex (XX or XY)[4].

Because experimental manipulation of human prenatal hormones is impossible, researchers rely on natural experiments. The most extensively studied condition is Congenital Adrenal Hyperplasia (CAH), an autosomal recessive genetic disorder causing the fetal adrenal glands to produce abnormally high levels of androgens. Berenbaum and Beltz (2011), in a comprehensive review published in *Frontiers in Neuroendocrinology*, synthesized the behavioral evidence on females with CAH[6]. Females with CAH exhibit significant, dose-dependent behavioral masculinization compared to their unaffected female relatives. The largest effects are observed in childhood play behavior and occupational interests, where CAH females show a robust, replicated preference for "male-typical" toys (e.g., vehicles, building blocks) and physical activities[8]. Moderate effects are observed in spatial cognition (specifically mental rotation tasks), while the effects on core gender identity are relatively small, with the vast majority of CAH females identifying as women[8]. These findings provide the strongest causal evidence that prenatal androgens exert a permanent, organizational effect on the neural substrates underlying specific behavioral dispositions, firmly establishing the physiological layer of sex differences.

The Developmental Onset of Differences: Early Temperament

If physiological mechanisms lay a dimorphic foundation, these behavioral differences should manifest early in life, prior to the onset of extensive, differential cultural socialization. Temperament—defined as biologically based individual differences in emotional reactivity and self-regulation—provides a clear window into these early divergences.

In a landmark meta-analysis published in *Psychological Bulletin*, Else-Quest, Hyde, Goldsmith, and Van Hulle (2006) aggregated data across 35 dimensions of temperament in children aged 3 months to 13 years[10]. Their findings revealed highly robust, replicated sex differences in specific temperamental domains. Girls exhibited a substantial advantage in "effortful control"—the capacity to voluntarily regulate attention and inhibit dominant, impulsive responses. Specifically, the facet of inhibitory control favored girls with a moderate-to-large effect size ($d = -0.41$), and perceptual sensitivity similarly favored girls ($d = -0.38$)[10]. Given the massive sample

sizes across the meta-analysis, the confidence intervals for these estimates are exceedingly tight (typically ± 0.02 to 0.05), confirming their statistical reliability. This early biological advantage in self-regulation directly correlates with the significantly higher incidence of externalizing psychopathology (such as ADHD, oppositional defiant disorder, and conduct disorder) observed in prepubescent boys.

Conversely, boys scored significantly higher on "surgency," a broad temperamental dimension reflecting high motor activity levels and a positive approach toward novel, potentially rewarding stimuli. Within surgency, boys demonstrated higher activity levels ($d = 0.33$) and high-intensity pleasure-seeking ($d = 0.30$), aligning with the greater frequency of active, rough-and-tumble play universally observed in male children across diverse cultures[10]. Notably, the meta-analysis found negligible sex differences in "negative affectivity" (the tendency toward sadness, fear, and frustration) during early childhood. This indicates that the widespread adult female elevation in neuroticism and internalizing disorders (e.g., clinical depression, generalized anxiety) likely emerges later in development, potentially catalyzed by the steroidal cascades of puberty interacting with accumulating social and environmental pressures[10].

Layer 2: Behaviour (Statistical, Overlapping Distributions)

Moving from childhood temperament to adult psychology, the behavioral layer quantifies psychological traits using large-scale psychometrics. At this level, it is essential to recognize that men and women do not occupy binary categories. Instead, their traits form overlapping normal distributions.

The Big Five Personality Traits

The Five-Factor Model (FFM)—comprising Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience—is the consensus taxonomy for adult human personality. A vast, globally replicated empirical literature demonstrates subtle but highly consistent sex differences across these broad domains.

In a seminal cross-cultural study published in the *Journal of Personality and Social Psychology*, Costa, Terracciano, and McCrae (2001) analyzed 26 cultures ($N = 23,031$), establishing that women consistently score higher on Neuroticism ($d = -0.51$ in the US normative sample) and Agreeableness ($d = -0.59$)[12]. These findings were substantially corroborated by Schmitt, Realo, Voracek, and Allik (2008) in the same journal, utilizing data from 55 nations ($N = 17,637$)[13]. Their findings confirmed the pervasive cross-cultural elevation of women in Neuroticism (global $d = -0.40$, US $d = -0.53$) and Agreeableness (global $d = -0.15$, US $d = -0.19$)[13]. More recently, utilizing a massive US public sample (

($N = 320,128$), Kajonius and Johnson (2018) reported that women score notably higher in Agreeableness ($d = -0.58$) and Neuroticism ($d = -0.40$)[16]. The sheer scale of these studies yields incredibly narrow confidence intervals, virtually eliminating sampling error as an explanation for these differences.

However, comparing personality solely at the broad domain level obscures vital nuances. The FFM traits are heterogeneous constructs composed of narrower, more specific facets. Costa et al. (2001) and Kajonius and Johnson (2018) note that within the domain of Extraversion, women score significantly higher on facets measuring warmth, gregariousness, and positive emotions, whereas men score higher on assertiveness and excitement-seeking[12]. Within Openness, women score higher on openness to aesthetics and feelings, while men score higher on openness to ideas[12]. Consequently, when these facets are aggregated to calculate a single domain score for Extraversion or Openness, the opposing sex differences cancel each other out. This mathematical artifact leads to the false conclusion that men and women do not differ in these domains, highlighting the necessity of facet-level analysis for accurate behavioral mapping[12].

An alternative structural framework, the HEXACO model, isolates Honesty-Humility and Emotionality as distinct factors from the traditional Big Five. Research utilizing the HEXACO framework reveals even larger univariate sex differences. Women average approximately one full standard deviation ($d \approx -1.0$) higher than men on Emotionality (which encompasses fearfulness, anxiety, dependence, and sentimentality) and almost half a standard deviation higher ($d = -0.43$) on Honesty-Humility (sincerity, fairness, greed-avoidance, modesty)[18]. Evolutionary psychologists theorize that the male deficit in Honesty-Humility reflects a higher fitness payoff for ancestral men who successfully exploited others to acquire status and resources, a high-risk strategy driven by the inherently higher variance in male reproductive success[18].

Vocational Interests: People vs. Things

While personality trait differences are generally of small to moderate magnitude, differences in vocational and activity interests produce some of the largest effect sizes in the entire psychological literature. The foundational paradigm for measuring interests is Holland's RIASEC model (Realistic, Investigative, Artistic, Social, Enterprising, Conventional), often summarized by Prediger's overarching dimension of "People vs. Things."

In the most exhaustive meta-analysis of vocational interests to date, published in *Psychological Bulletin*, Su, Rounds, and Armstrong (2009) synthesized data from 47 distinct interest inventories across a sample of 503,188 respondents[19]. They uncovered a massive sex difference along the Things-People dimension, yielding a Cohen's d of 0.93 (with extraordinarily tight confidence intervals due to the half-million sample size)[19]. Men overwhelmingly prefer working with things (machines, tools, abstract systems), while women overwhelmingly prefer working with people (helping, nurturing, teaching)[19].

When broken down into Holland's specific RIASEC types, the meta-analysis revealed the following robust effect sizes[19]:

RIASEC Type	Core Focus	Effect Size (d)	Direction
Realistic	Practical, hands-on, machines	0.84	Large male advantage
Investigative	Analytical, scientific inquiry	0.26	Small male advantage
Enterprising	Leadership, persuasion, economics	0.04	Negligible difference
Conventional	Organization, data processing	-0.33	Moderate female advantage
Artistic	Creative expression	-0.35	Moderate female advantage
Social	Helping, teaching, counseling	-0.68	Large female advantage

Furthermore, when assessing highly specific basic interests, Su et al. (2009) found profound differences in STEM-related domains, including engineering ($d = 1.11$), science ($d = 0.36$), and mathematics ($d = 0.34$)[19]. These findings have profound implications for occupational sorting in modern economies. The magnitude of the "Things vs. People" divergence explains a substantial portion of the gender disparities observed in heavily technical fields (e.g., software engineering, mechanics) versus deeply interpersonal fields (e.g., nursing, early childhood education), functioning independently of cognitive ability or structural barriers[20].

Empathy and Systemizing

The "Things vs. People" interest dichotomy maps perfectly onto the Empathizing-Systemizing (E-S) theory of psychological sex differences developed by Simon Baron-Cohen. Empathizing is the drive to identify another's mental state and respond with an appropriate emotion, whereas systemizing is the drive to analyze, explore, or construct rule-based systems.

In a massive empirical test of the E-S theory published in the *Proceedings of the National*

Academy of Sciences (PNAS), Greenberg, Warrier, and Baron-Cohen (2018) analyzed self-report data from 671,606 individuals[24]. The results provided overwhelming replication and support for the theory. Typical females scored significantly higher on the Empathy Quotient (EQ) ($d = -0.39$), while typical males scored higher on the Systemizing Quotient (SQ) ($d = 0.31$)[24].

The researchers categorized individuals into distinct "brain types" based on the discrepancy between their EQ and SQ scores. Typical females were significantly more likely to possess a Type E brain (EQ > SQ), whereas typical males were more likely to possess a Type S brain (SQ > EQ)[24]. An extension of this framework, the Extreme Male Brain (EMB) theory of autism, posits that autistic individuals exhibit an extreme Type S profile. Greenberg et al. (2018) confirmed this, demonstrating that autistic individuals, regardless of their biological sex, exhibited a strongly "masculinized" profile characterized by severe deficits in empathizing alongside intact or superior systemizing[24]. The D-score (the mathematical difference between an individual's EQ and SQ) accounted for a staggering 43% of the variance in autistic traits, far surpassing the predictive power of any other demographic variable, including chromosomal sex itself[24].

Values and Life Goals

Human values—the broad, trans-situational motivational goals that guide decisions and behavior—also exhibit systematic sex differentiation. Schwartz's Theory of Basic Human Values organizes ten universal motivations along two bipolar axes: Self-Transcendence vs. Self-Enhancement, and Conservation vs. Openness to Change.

In a major cross-cultural study published in the *Journal of Personality and Social Psychology*, Schwartz and Rubel (2005) analyzed gender differences in value priorities[26]. They found that women consistently place higher importance on Self-Transcendence values, specifically Benevolence (preserving and enhancing the welfare of those with whom one is in frequent personal contact) and Universalism (understanding, appreciation, tolerance, and protection for the welfare of all people and nature)[26]. Conversely, men place significantly higher importance on Self-Enhancement values, namely Power (social status, prestige, control over people and resources) and Achievement (personal success through demonstrating competence according to social standards)[26]. Men also consistently score higher on Openness to Change values, such as Stimulation and Hedonism[26].

These differences in fundamental values intersect critically with life goals and definitions of success. In a 40-year longitudinal follow-up of the Study of Mathematically Precocious Youth (SMPY), Lubinski, Benbow, and Kell (2014) published findings in *Psychological Science* tracing the trajectories of 1,650 profoundly gifted individuals (identified in the top 1% of mathematical reasoning ability at age 13)[28]. By mid-life, both the men and women were extraordinarily accomplished, achieving advanced degrees, patents, and publications at rates vastly exceeding the general population, and reporting universally high life satisfaction[28].

However, their chosen paths diverged fundamentally in ways predicted by Schwartz's value theory. Men were significantly more likely to prioritize intense, full-time career advancement, entering STEM fields and corporate CEO tracks, frequently working 50 to 60+ hours a week to

maximize status and income[28]. Women, despite possessing equal cognitive capacity and early mathematical brilliance, more frequently chose careers in general business, healthcare, or education. Crucially, women were far more likely to allocate time away from full-time careers to prioritize family, community involvement, or a balanced lifestyle[28]. The insight here is vital for social policy: differing occupational outcomes do not necessarily indicate structural failure or discrimination, but frequently reflect deeply embedded, sex-differentiated values regarding what constitutes a meaningful and successful life.

Aggression, Risk-Taking, and Impulsivity

Sex differences in aggression and risk-taking are among the most robust findings in psychology, strongly predicted by evolutionary theories regarding male intra-sexual competition for mates and resource acquisition.

Archer's (2004) comprehensive review in the *Review of General Psychology* confirmed that males are vastly more likely to engage in unprovoked, direct physical aggression[30]. This physical aggression discrepancy is evident cross-culturally and spans developmental epochs from toddlerhood through late adulthood[30]. However, when examining indirect or relational aggression (e.g., social exclusion, reputational sabotage, malicious gossip), the sex difference attenuates entirely, with females often scoring slightly higher than males[31]. This indicates that females possess highly developed competitive aggressive drives but execute them through social networks to minimize the risk of direct physical harm.

Risk-taking and impulsivity provide further nuance regarding how the sexes navigate potential harm. Byrnes, Miller, and Schafer (1999) conducted a meta-analysis in *Psychological Bulletin* confirming a generalized male propensity for risk-taking, particularly in physical and financial domains[32]. To dissect the precise cognitive mechanisms of this risk-taking, Cross, Copping, and Campbell (2011), also in *Psychological Bulletin*, analyzed 741 effect sizes across 277 studies on impulsivity[34]. They utilized a tripartite theoretical model of impulsivity: reward hypersensitivity, punishment hyposensitivity, and inadequate effortful control.

Their meta-analysis revealed a highly complex and illuminating picture. Men and women did *not* differ in reward sensitivity ($d = 0.01$), nor did they differ in executive function tasks assessing delay discounting[34]. However, men demonstrated significantly higher sensation-seeking on self-report questionnaires ($d = 0.41$) and in behavioral risk-taking tasks ($d = 0.36$)[34]. Most critically, women were consistently and substantially more sensitive to punishment ($d = -0.33$)[34]. These findings suggest that the greater physical risk-taking, criminality, and externalizing behaviors observed in men are not driven by a lack of executive cognitive control or an overactive drive for reward, but rather by a diminished biological sensitivity to potential harm, pain, or punishment[34].

Relatedly, behavioral economics has established profound sex differences in raw competitiveness. Niederle and Vesterlund (2007), in an elegant laboratory experiment published in the *Quarterly Journal of Economics*, demonstrated that when given a choice between a non-competitive piece-rate payment and a winner-take-all tournament, 73% of men

chose the competitive tournament compared to only 35% of women[36]. Crucially, this massive gap persisted even when controlling for actual performance ability on the underlying task[37]. Low-ability men entered tournaments when they lacked the competence to win (driven by overconfidence), while highly competent women systematically shied away from the competition[37]. The researchers concluded that a substantial portion of this variance is driven by an innate male preference for, and female aversion to, competitive environments themselves, irrespective of the financial payoff[37].

Layer 3: Culture and the Gender-Equality Paradox

If psychological sex differences were entirely artifacts of patriarchal social conditioning and unequal role assignments, one would hypothesize that as a society becomes more economically developed, legally egalitarian, and secular, the psychological differences between men and women would steadily diminish. Decades of cross-cultural research have decisively demonstrated the exact opposite phenomenon, now known as the "Gender-Equality Paradox." Costa, Terracciano, and McCrae (2001) were among the first to note this counterintuitive trend, finding that sex differences in Neuroticism and Agreeableness were significantly larger in prosperous, egalitarian Western nations than in traditional, patriarchal societies in Asia and Africa[12]. This was definitively confirmed by Schmitt et al. (2008) in their 55-nation study, which proved that higher levels of human development—including health, access to education, and economic wealth—were the primary macro-level predictors of *larger* sex differences in Big Five personality traits[13].

More recently, Falk and Hermle (2018) published an analysis in *Science* of 80,000 individuals across 76 countries, measuring core economic preferences for risk, patience, altruism, positive reciprocity, negative reciprocity, and trust[40]. Consistent with previous psychometric literature, they found that women are generally more prosocial (altruistic, trusting) and less risk-taking than men. Crucially, they found a strong, highly significant positive correlation between the magnitude of these sex differences and national indices of economic development (GDP per capita) and gender equality (the Global Gender Gap Index)[41].

Two primary hypotheses attempt to explain this paradox. The evolutionary and biological perspective posits a "diathesis-stress" or "resource relaxation" model[43]. In impoverished, harsh, or highly constrained traditional societies, both men and women are forced to act in ways that maximize immediate survival and economic utility, which artificially suppresses the expression of innate predispositions[43]. When societies become wealthy and egalitarian, severe resource constraints are lifted, allowing individuals the unprecedented freedom to actualize their intrinsic, biologically influenced preferences[15]. Consequently, when people are perfectly free to choose, underlying dimorphic biological tendencies express themselves maximally, leading to wider divergence in personality and occupational choices.

Conversely, some social constructivist scholars, such as Breda et al. (2020) in *PNAS*, argue that modern egalitarian societies, while removing explicit legal barriers, inadvertently replace them with pervasive, subtle cultural stereotypes that push men and women into highly differentiated paths[44]. However, the consistency of the paradox across highly diverse metrics—from personality traits to spatial ability, occupational sorting, and depression rates—heavily bolsters

the resource relaxation hypothesis over the stereotype hypothesis.

Distinguishing Averages from Individuals

A critical error in interpreting psychological sex differences is conflating group averages with individual, deterministic predictions. Because the traits discussed above are continuously and normally distributed, a mean difference between sexes implies two overlapping bell curves, not two distinct, non-overlapping categories.

The interpretation of Cohen's d clarifies the extent of this overlap. A standard "moderate" effect size of $d = 0.50$ (such as the female advantage in Agreeableness or Neuroticism) means that the average woman scores higher than approximately 69% of men. Conversely, it dictates that roughly 31% of men still score higher than the average woman. Even for a very large difference, such as the male preference for working with "Things" ($d = 0.93$), the distributions overlap by about 50%. Therefore, knowing an individual's biological sex provides a statistically valid prior probability for guessing their personality, interests, or competitive drive, but it is wholly insufficient for diagnosing, predicting, or restricting the trajectory of any specific individual.

Controversies and the Strongest Evidence on Both Sides

1. The Multivariate Personality Debate

While univariate effect sizes (analyzing one trait at a time) for personality are generally small to moderate, the aggregate psychological difference between men and women is highly contested.

The Strongest Evidence for Large Differences: Del Giudice, Booth, and Irwing (2012), writing in *PLoS One*, argued that analyzing traits in isolation fundamentally misrepresents human psychology because personality is an integrated, multivariate construct. By utilizing multigroup latent variable modeling to assess the simultaneous combination of 15 personality scales, they calculated a massive multivariate effect size (Mahalanobis D) of 2.71[45]. Mahalanobis distance measures the distance between the multivariate means of the two sexes while accounting for the covariance between the traits. A D of 2.71 indicates that the male and female multivariate personality distributions overlap by less than 10%. They argued that when viewed holistically in multidimensional space, the psychological distance between the sexes is massive, effectively validating the colloquial "Mars and Venus" dichotomy[45].

The Leading Critics: The most prominent critic of this view is Janet Shibley Hyde, author of the widely cited "Gender Similarities Hypothesis" (2005). Hyde argues that the vast majority of psychological sex differences yield univariate effect sizes smaller than $d = 0.35$, rendering men and women vastly more similar than they are different. Critics of Del Giudice point out that Mahalanobis D mathematically inflates effect sizes by summing numerous minor, potentially

artifactual variances across highly correlated dimensions, thus exaggerating the functional, day-to-day differences between real human beings in social interactions.

2. Origins of Differences: Evolutionary vs. Social Role Theory

Social Role Theory: Articulated most forcefully by Eagly and Wood (1999) in the *American Psychologist*, Social Role Theory (and later Biosocial Theory) posits that psychological sex differences do not stem from evolved, genetically hardwired dimorphic brain mechanisms[46]. Instead, physical differences (specifically male size/strength and female gestation/lactation) historically drove an efficient division of labor[46]. Men and women then psychologically accommodated to these distinct societal roles. Therefore, the causal arrow flows from the social structure down to psychological differentiation, and any biological mechanisms (e.g., adult hormone fluctuations) are merely proximal mediators rather than ultimate evolutionary adaptations[46].

Evolutionary Psychology: Leading evolutionary psychologists, including David Buss and Daniel Nettle (2006, *Evolution and Human Behavior*), argue that Social Role Theory fails on several empirical fronts[48]. It fails to account for why these traits emerge in infancy before socialization can act (e.g., temperament), why they are tied tightly to prenatal androgen exposure in utero, and why sex differences reliably *increase* rather than decrease in modern societies where historical social roles and physical strength requirements have been explicitly de-gendered[48]. They maintain that male and female psychologies are true evolutionary adaptations, shaped by sexual and natural selection to solve the differing reproductive challenges faced on the Pleistocene savannah.

The Greater Male Variability Hypothesis (GMVH)

A vital, often overlooked statistical reality in differential psychology is the Greater Male Variability Hypothesis (GMVH). The GMVH posits that males of a species exhibit greater variance in both physical and psychological traits than females, meaning males are systematically overrepresented at both the extreme top and extreme bottom of a distribution, even if the mean average is identical. First noted by Charles Darwin and later expanded by Havelock Ellis in the late 19th century, the GMVH remains a robust statistical reality in modern psychometrics[50].

Recent large-scale analyses of international testing data (e.g., Baye & Monseur, 2016; Gray et al., 2019) confirm that male variance significantly exceeds female variance in mathematics, reading, and cognitive abilities across the vast majority of OECD nations[52]. This greater variability extends to personality traits, creativity, and impulsivity[53].

Evolutionary biology explains this phenomenon via the "selectivity-variability principle" and male heterogamety[55]. Because males have only one X chromosome, recessive mutations are fully expressed phenotypically rather than being buffered by a second X chromosome (as in females). Furthermore, because mammalian females are the limiting factor in reproduction (higher obligate parental investment), they are highly selective in mate choice. This sexual selection pressure favors high variance in males, as a high-risk/high-reward strategy is necessary to secure reproductive success. The GMVH is crucial for understanding macro-societal outcomes: it perfectly explains why males dominate the uppermost echelons of

intellectual and corporate achievement (e.g., Nobel laureates, CEOs, patent holders), while simultaneously dominating the absolute bottom deciles (e.g., homeless populations, prison inmates, individuals with severe learning disabilities or completed suicides) without necessitating any difference in the population mean[50].

10-Line Summary of Robust Findings

1. Prenatal exposure to fetal testosterone fundamentally organizes the developing brain, influencing later spatial abilities, vocabulary, and autistic traits.
2. Infant girls display greater effortful control, while infant boys exhibit greater surgency and high-intensity pleasure-seeking prior to socialization.
3. Adult women score moderately higher on the Big Five traits of Neuroticism and Agreeableness, a finding replicated across almost all measured cultures.
4. The largest psychological sex difference lies in vocational interests: men overwhelmingly prefer working with "Things," while women prefer "People" ($d = 0.93$).
5. The Empathizing-Systemizing theory reveals women possess a stronger drive to empathize, while men possess a stronger drive to analyze rule-based systems.
6. Men engage in vastly more unprovoked physical aggression and risk-taking, driven by a biological hyposensitivity to punishment rather than a lack of executive control.
7. Men embrace competitive, winner-take-all environments significantly more than women, even when actual competence levels are equal.
8. The "Gender-Equality Paradox" proves that psychological sex differences reliably *increase* as societies become wealthier and more egalitarian.
9. Males exhibit greater statistical variability than females across cognitive and psychological traits, overpopulating both the extreme high and low ends of distributions.
10. While broad statistical patterns are robust and evolutionary in origin, male and female distributions overlap heavily, rendering group-level data inadequate for judging individuals.

Contested or Open Questions

- **The Multivariate Calculation:** Does aggregating small univariate differences using Mahalanobis D accurately reflect lived psychological reality, or does it mathematically exaggerate minor divergences due to covariance?
- **The Cause of the Gender-Equality Paradox:** Is the amplification of differences in egalitarian nations purely a result of "resource relaxation" allowing innate biology to flourish, or are subtle, modern cultural stereotypes driving divergent choices?
- **Female Indirect Aggression:** While men dominate physical aggression, the exact evolutionary mechanics, longitudinal stability, and cross-cultural prevalence of female relational and reputational aggression remain under-mapped.
- **Pubertal Organization:** While prenatal hormones (fT) are known to organize the brain, the extent to which the massive hormonal cascades of puberty permanently *re-organize* adult personality and psychopathology remains poorly understood.
- **The Mechanism of GMVH:** Is greater male variability purely a function of genetic

architecture (the fragile X chromosome), or do varying levels of postnatal testosterone actively destabilize and widen phenotypic expression?

5 to 10 Most Important Sources to Read in Full

1. **Su, R., Rounds, J., & Armstrong, P. I. (2009).** *Men and things, women and people: A meta-analysis of sex differences in interests.* Psychological Bulletin.
2. **Greenberg, D. M., Warrier, V., & Baron-Cohen, S. (2018).** *Testing the Empathizing–Systemizing theory of sex differences and the Extreme Male Brain theory of autism in half a million people.* PNAS.
3. **Schmitt, D. P., et al. (2008).** *Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures.* Journal of Personality and Social Psychology.
4. **Falk, A., & Hermle, J. (2018).** *Relationship of gender differences in preferences to economic development and gender equality.* Science.
5. **Cross, C. P., Copping, L. T., & Campbell, A. (2011).** *Sex differences in impulsivity: A meta-analysis.* Psychological Bulletin.
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8. **Else-Quest, N. M., et al. (2006).** *Gender differences in temperament: A meta-analysis.* Psychological Bulletin.
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10. **Eagly, A. H., & Wood, W. (1999).** *The origins of sex differences in human behavior: Evolved dispositions versus social roles.* American Psychologist.

Implications for Living Together

Synthesizing these robust empirical data provides highly actionable implications for how men and women can best coordinate in couples, families, organizations, and societies. However, this application must be prefaced by a strict rejection of the naturalistic fallacy: simply because a psychological trait is biologically influenced, naturally occurring, or evolutionary in origin does not mean it is morally "good," inevitable, or socially optimal. Biology is a foundation, not a destiny.

For **couples and families**, understanding the biological reality of differences in Neuroticism and Agreeableness can foster profound grace and conflict resolution. Recognizing that a male partner's lower empathy or higher drive to systemize, or a female partner's higher anxiety (punishment sensitivity), are often features of innate neurobiology rather than deliberate malice or character flaws can drastically reduce interpersonal friction. Furthermore, couples navigating the division of labor should recognize that achieving a strict 50/50 split in career intensity and domestic focus is statistically anomalous. As demonstrated by Schwartz's value theory and the SMPY data, differing values placed on status (Power/Achievement) versus

relationships (Benevolence) often lead to asymmetric, yet highly satisfying, complementary partnerships.

For **organizations**, the literature on competitiveness and risk-taking is vital for talent retention and structural design. Because men embrace winner-take-all tournaments even when incompetent, and highly competent women systematically shy away from them, organizations relying on aggressive self-promotion, extreme risk-taking, and hyper-competitive tournament structures for advancement will inevitably filter out highly capable women. To optimize talent, organizations must design evaluation metrics that rely on objective output and collaborative assessment rather than self-advocacy. Furthermore, organizations must accept that the massive "Things vs. People" interest disparity means that attempting to force rigid 50/50 gender parity in highly specific sub-fields (e.g., mechanical engineering vs. human resources) will require fighting upstream against profound, freely chosen psychological preferences.

For **societies**, the Gender-Equality Paradox serves as a vital guiding compass for macroeconomic and social policy. True egalitarianism—maximizing human freedom and removing legal and structural barriers—does not result in the behavioral homogenization of the sexes. In fact, maximizing freedom maximizes the expression of biological dimorphism. Therefore, societies must carefully decouple the concept of *equality of opportunity* from *equality of outcome*. A healthy society accepts that men and women will, on average, aggregate into different occupational roles, take different risks, and pursue different life goals, while simultaneously ensuring that the heavily overlapping nature of these distributions guarantees that every individual is judged strictly on their specific merits, free from the constraints of aggregate stereotyping.

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