



Evolutionary Psychology, Personality & Individual Differences

“With the growing acceptance of evolution as a metatheory for psychology, more and more personality psychologists are trying to conceptualize personality within an evolutionary framework.

—Penke, Denissen, & Miller, 2007, p. 553.

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“All ‘grand’ theories of personality have hypotheses about the contents of human nature at their core, such as motives for sex and aggression (Freud), self-actualization (Maslow), striving for superiority (Adler), or striving for status and intimacy (McClelland, Murray, Wiggins).” [Buss p 407]

Central to Personality Theory: individual differences

In contrast, Evolutionary Psychology focuses on **species-typical** psychological mechanisms – cannot readily explain individual differences. Heritable differences are particularly puzzling.

Personality differences show moderate heritability, 30-50%.

... and a considerable environmental component, 50-70%

Digression 1: Minnesota Twin Study (Bouchard, McGue et al)

Digression 2: Big Five

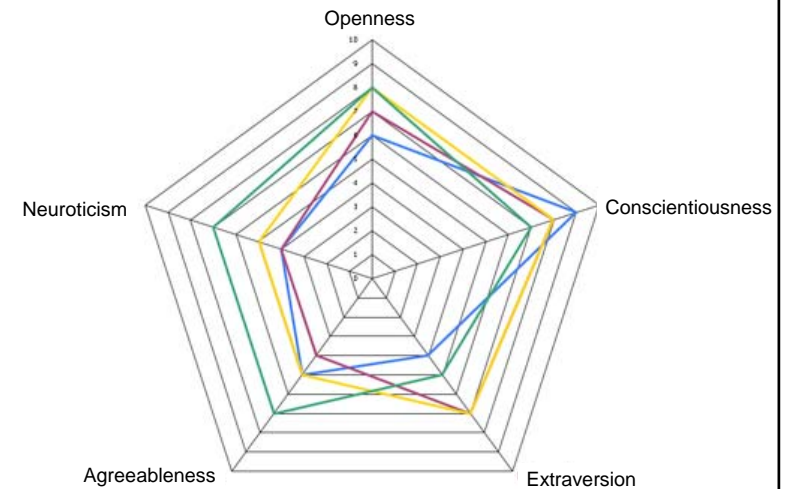
Minnesota Twin Study (Bouchard, McGue et al)

One example: identical twin brothers Gerald Levy and Mark Newman, were separated at birth, never knew one another existed and were raised in different households, eliminating any common environmental influences. After meeting for the first time at the age of 32, they discovered an astonishing list of common characteristics: both had become firefighters, one in Queens and one in New Jersey, they grew the same mustache and sideburns, making their appearances basically undistinguishable.

They share a long list of common favorite pastimes, including hunting, fishing, going to the beach, watching old John Wayne movies and pro wrestling. Both men drink Budweiser beer, holding the can with one pinkie curled underneath and crushing the can when it's empty.



The Big 5 Personality Traits



1. **Extraversion:** This trait includes characteristics such as excitability, sociability, talkativeness, assertiveness and high amounts of emotional expressiveness.
2. **Agreeableness:** This personality dimension includes attributes such as trust, altruism, kindness, affection, and other prosocial behaviors.
3. **Conscientiousness:** Common features of this dimension include high levels of thoughtfulness, with good impulse control and goal-directed behaviors.
4. **Neuroticism:** Individuals high in this trait tend to experience emotional instability, anxiety, moodiness, irritability, and sadness.
5. **Openness:** This trait features characteristics such as imagination and insight, and those high in this trait also tend to have a broad range of interests.

Dimension	High scorers are:	Low scorers are:
Extraversion	Outgoing, enthusiastic, active; seeks novelty	Aloof, quiet, independent; cautious, enjoy time alone
Neuroticism	Prone to stress & worry; irritable, moody	Emotionally stable but can take unnecessary risks
Conscientiousness	Organized, self-directed, dependable, but controlling	Spontaneous, careless, can be prone to addiction
Agreeableness	Trusting, empathetic, compliant, affable	Uncooperative, hostile; unempathetic
Openness	Open to new experiences, curious, creative, imaginative	Practical, conventional, skeptical, rational

Heritabilities of Personality Big 5

Table 5 Broad Heritabilities of Self-Report Measures of the Big Five Factors Based on Four Recent Twin Studies, a Comprehensive Review of Twin, Adoption, and Biological Kinships (Loehlin, 1992), and a Summary of the Earlier Twin Literature (Bouchard, 1997)

Trait	Recent Twin Studies				Mean of the Four Recent Studies	Reviews	
	Jang et al. (1996) (Canada)	Waller (1999) (US)	Loehlin et al. (1998) (US)	Riemann et al. (1997) (Germany)		Loehlin (1992) Review of Kinships	Bouchard (1997) Summary of Literature
Extraversion	.53	.49	.57	.56	.54	.49	.54
Agreeableness	.41	.33	.51	.42	.42	.35	.52
Conscientiousness	.44	.48	.52	.53	.49	.38	.40
Neuroticism	.41	.42	.58	.52	.48	.41	.58
Openness	.61	.58	.56	.53	.57	.45	.52
MZ pairs	123	313	490	660			
DZ pairs	127	91	317	304			

Bouchard, T. J. & McGue, M. (2003). "Genetic and environmental influences on human psychological differences". *Journal of Neurobiology* 54: 4–45.

Extraversion	54%
Agreeableness	42%
Conscientiousness	49%
Neuroticism	48%
Openness to experience	57%

Individual differences have been ignored in evolutionary biology and related fields because of the theoretical assumption that natural selection will reduce or eliminate ("use up") heritable individual differences because traits (genes) that are advantageous will "go to fixation". Heritable differences are thus viewed as "noise".

Why Individual Differences are evolutionarily important:

1. They occur in important realms (dominance vs submissiveness, mellowness vs aggressiveness, general intelligence vs more specific abilities, long-term vs short-term mating strategies, etc.)
2. They are **heritable** (ave ~50%) and stable over time
3. They have been shown to have important consequences for evolutionarily relevant outcomes, such as survival, mating success, offspring production, parenting
4. Individuals often differ substantially with respect to their mating strategies.

“Theoretically, individual differences are also profoundly important. Individual differences are pivotal to the vast majority of social adaptive problems. Consider selecting a mate. **Constants simply do not count.** No woman ever thought, ‘Wow, this guy is really attractive—he has an opposable thumb, walks bipedally, and speaks a language!’ **Species-typical characteristics become invisible when solving the adaptive problem of mate selection.** Only **differences** between individuals count – in attractiveness, intelligence, dependability, health, agreeableness, ambition, empathy, and so forth.

☛ Humans have evolved **difference-detecting adaptations**

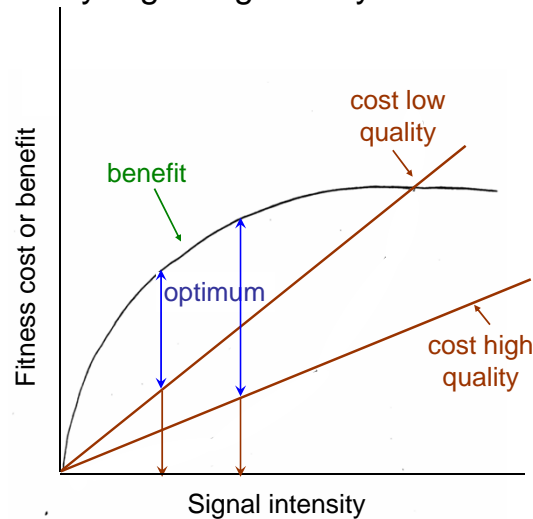
Life History Theory

An individual has finite time and energy budgets. Effort allocated to solving one adaptive problem **trades off with** effort allocated to other adaptive problems. For example, within **reproductive effort**, an important ‘decision’ is how much to allocate between mating **effort** and **parental investment**. The optimal trade-off between different allocations will differ depending on variables such as

- one’s own quality
- life expectancy (if its short, steeper future discounting pays)
- total energy individual has
- abilities, e.g., fathering vs getting mates
- mating prospects (if bleak, ratchet up investment in kin?)

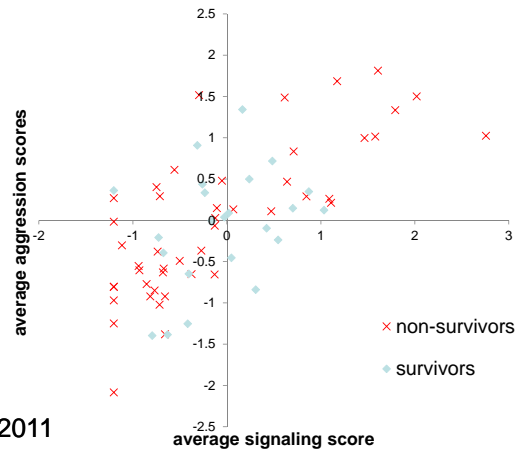
Costly Signaling Theory

“Costly signaling theory can be linked to life-history theory. [For example] a male who cannot afford to produce high-quality signals as a short-term mate ... might shift to a life-history strategy of heavy investment in one long-term committed mateship.”
– Buss



- **Balancing Selection** occurs when genetic variation is *maintained* by selection
- **Environmental Heterogeneity in Fitness Optima**
 - introversion vs extraversion in island vs mainland Italy populations
 - ADHD in migratory populations (7R allele of the DRD4 gene)
- **Frequency Dependent Selection**
 - example: Sociopathy?

Song sparrow example of balancing selection:
birds that were either high or low on aggression/signalling
were more likely not to survive the next year



EP of Personality & Individual Differences

1. Alternative Niche Picking (aka Strategic Specialization)

- Mate with high-status polygynist or low-status monogamist (does this require personality difference?)
- First borns identify with status quo, later borns want to overthrow it (is this adaptive?)

2. Adaptive (Self-) Assessment of Heritable Qualities

- Pursue aggressive strategy if you have the wherewithal, otherwise cooperative
- Males: If handsome, pursue short-term sexual strategy, if not, pursue long-term monogamous strategy

3. Frequency-dependent Adaptive Strategies

- Directional selection tends to **use up** heritable variation
- Frequency dependent selection: payoff of strategy **declines** as its **frequency** in population **increases**

Summary of Hypothesized Fitness Benefits and Costs of Increasing Levels of Each of the Big Five Personality Dimensions

Domain	Benefits	Costs
Extraversion	Mating success; social allies; exploration of environment	Physical risks; family stability
Neuroticism	Vigilance to dangers; striving and competitiveness	Stress and depression, with interpersonal and health consequences
Openness	Creativity, with effect on attractiveness	Unusual beliefs; psychosis
Conscientiousness	Attention to long-term fitness benefits; life expectancy and desirable social qualities	Missing of immediate fitness gains; obsessiveness; rigidity
Agreeableness	Attention to mental states of others; harmonious interpersonal relationships; valued coalitional partner	Subject to social cheating; failure to maximize selfish advantage

Nettle 2006

Bet-hedging hypothesis: sexual reproduction & variation **decreases variance in RS** and hence increases the geometric mean fitness when there is environmental heterogeneity a/o balancing selection

$$\mu_A = \text{arithmetic mean} = (X_1 + \dots + X_N) / N$$

$$\mu_G = \text{geometric mean} = (X_1 \cdot \dots \cdot X_N)^{1/N}$$

$$\mu_G = \mu_A - \sigma^2/2$$