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# Evolved individual differences: Advancing a condition-dependent model of personality

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ABSTRACT

The field of personality psychology offers a wealth of robust empirical research and a successful descriptive taxonomy, but neither explains the origins of the structure of human personality nor elaborates a generative framework for predicting the specific conditions that evoke the development of distinct personality traits. Exploration of traditional personality constructs within an evolutionary adaptive individual differences framework may help fill this explanatory gap. Personality traits exhibit functional features and patterns of variation expected from psychological adaptations designed to solve survival- and reproduction-related challenges recurrently faced during our species' evolutionary history. Condition-dependent evolutionary models of personality have been proposed for decades, but only recently have begun to see empirical investigation. These models posit that species-typical psychological mechanisms take as input cues from the individual's phenotype that would have been ancestrally linked to differential cost–benefit tradeoffs of alternative personality strategies, and produce as output personality trait levels with the greatest probabilistic net benefit for the individual. This paper elaborates a more nuanced conceptual framework that builds on earlier conceptualizations of condition-dependent traits to yield new and untested hypotheses about personality trait variation and covariation. It then describes clear future research directions for empirically investigating these readily testable hypotheses.



## 1. Introduction

At present, the field of personality psychology offers a wealth of robust empirical research and a successful descriptive taxonomy, but does not answer why personality differences take on the structure that they do, or elaborate a generative framework for predicting the specific conditions that evoke the development of distinct personality trait levels. An adaptationist evolutionary psychological approach, which proposes that many human behaviors, cognitions, and emotions are the output of psychological mechanisms designed to solve distinct adaptive problems (Buss, 1995), may offer a cogent predictive framework for identifying the causal processes responsible for the development of personality traits and the social contexts that activate them.

Within an adaptive individual differences framework, different personality traits can be conceptualized as functional strategies that help solve specific problems recurrently faced by members of a species during its evolution (Buss, 2009). In the study of humans, this adaptationist perspective is generally applied using a "top-down" approach (Buss, 1995). First, the researcher identifies a specific challenge to survival or reproduction in ancestral environments. Second, the researcher articulates the behaviors that would have helped solve this adaptive problem, as well as the cognitive processes and emotions that would have motivated these behaviors. The researcher then conducts empirical tests for evidence of these hypothesized, functionally specialized cognitive, affective, and behavioral design features.

Personality psychology has historically operated outside of such an *a priori* predictive theoretical framework, focusing more on the statistical structure of individual differences than on the potential evolutionary functional origins of those differences (Buss, 1987, 1990, 1991a,b, 1996a,b, 1999; Buss, Larsen, Westen, & Semmelroth, 1992).

Recent work (e.g., Kanazawa, 2011; Penke, Denissen, & Miller, 2007; Verweij et al., 2012) has explored multiple potential evolutionary models for individual differences in personality. However, theorists have largely overlooked the possibility that species-typical psychological adaptations produce individual differences in personality, instead favoring models that assume more direct gene → personality effects. Given the relative neglect of the powerful, but under-utilized tool of condition-dependent adaptations, this paper places a particular focus on adaptive individual

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differences that emerge from condition-linked differences in the costs and benefits of alternative personality traits.

### 1.1. The benefits and costs of personality traits

Although personality and evolutionary psychology have traditionally had different foci of empirical inquiry, an exploration of the evolutionary functionality of the Five-Factor Model (FFM, Costa & McCrae, 1985), one of the most widely validated models of human personality and whose dimensions are exhibited in a diverse array of non-human animal species (see Gosling & John, 1999; Nettle, 2006; Smith & Blumstein, 2008), illustrates how an adaptationist conceptual framework may be fruitfully applied to the study of human individual differences. The high pole of extraversion in humans, for example, may be conceptualized as an interpersonal strategy that can increase mating opportunities (MacDonald, 2006). High levels of extraversion could lead to increased mating opportunities both directly by engaging potential mates and indirectly by leading to the formation of friendships and social alliances that facilitate increases in status and ascension in the social hierarchy (Denissen & Penke, 2008; Nettle, 2005, 2006). Data from non-human animals offer evidence consistent with this hypothesized function of extraversion; bold behavior by Trinidadian guppies (Godin & Dugatkin, 1996), zebra finches (Schuett & Dall, 2009), and collared flycatchers (Garamszegi, Eens, & Török, 2008) is associated with increased mating success. A hypothesized function of high agreeableness is that it facilitates successful collective action by leading individuals to deeply engage in and focus on cooperation to achieve group goals (Denissen & Penke, 2008), an interpersonal orientation that is also invaluable in a long-term mate. Indeed, in some nonhuman species, signals of non-aggressive strategies appear to increase individuals' desirability as long-term mates (see Ophir & Galef, 2003; Ophir, Persaud, & Galef, 2005). High levels of conscientiousness are hypothesized to promote successful pursuit of long-term goals such as good health and longevity by means of determination, self-discipline, and delayed gratification (Denissen & Penke, 2008; Nettle, 2006), and the creative problem-solving capacities exhibited by individuals high in openness to experience may lead to enhanced status and increased mating opportunities (Haselton & Miller, 2006; Lewis, Al-Shawaf, & Yilmaz, 2014).

Even high levels of neuroticism, a personality trait that has historically been framed exclusively as "maladaptive" (Grant, 2011, p. 42), may at least partly reflect the output of evolved psychological mechanisms. Several theorists have proposed that humans possess evolved psychological mechanisms designed to elevate neuroticism levels as a functional response to the threat of social exclusion (Denissen & Penke, 2008; Nettle, 2005, 2006). Higher levels of neuroticism are associated with endogenously driven attentional shifts (Flehmig, Steinborn, Langner, & Westhoff, 2007), which may guide attention toward negative social outcomes such as relationship exclusion or dissolution. Such selective attention to potential threat cues (Gallagher, 1990; Hemenover & Dienstbier, 1996) and focusing on negative information (Hemenover, 2001) may result in greater sensitivity to potential negative social outcomes (Grant, 2011; Kuppens & Van Mechelen, 2007), as well as greater worry and anxiety in response to potential relationship threats. In turn, these cognitive and affective states may motivate behaviors such as vigilance and guarding of one's relationship partners to protect limited relationship opportunities (Denissen & Penke, 2008; Nettle, 2005, 2006).

The key idea is that traditional personality constructs are not only amenable to exploration within an adaptive individual differences framework, but also exhibit characteristics expected of psychological adaptations designed to solve fitness-relevant problems recurrent in human ancestral environments.

Although a given strategy on a particular personality dimension may serve reproductive benefit-linked functions, each strategy also carries potential costs. In non-human species, exploratory or bold behavior may increases risk of predation (guppies: Dugatkin, 1992; Godin & Davis, 1995; theoretical model: Wolf, van Doorn, Leimar, & Weissing, 2007; for review, see Smith & Blumstein, 2008), and among humans, extraversion can similarly carry fitness-relevant costs – extraverts are disproportionately represented in hospitals with injury or illness (Nettle, 2005) and their pronounced sensation-seeking can lead to traumatic injury (Field & O'Keefe, 2004) and legal trouble (Ellis, 1987). Similarly, high levels of agreeableness can carry fitness costs; individuals who avoid conflict are less desirable as mates in a variety of species, including humans (e.g., fighting fish: Doutrelant & McGregor, 2000; Midas cichlid: Barlow, 1986; humans: Lukaszewski & Roney, 2011), and high agreeableness may lead individuals to forgo their own objectives and risk social exploitation (Judge, Livingston, & Hurst, 2011). Although high levels of neuroticism may cognitively and affectively motivate an individual to protect limited social opportunities, high neuroticism is associated with impaired somatic health (Cohen & Williamson, 1991; Glaser & Kiecolt-Glaser, 2005; Herbert & Cohen, 1993; O'Leary, 1990) and can place burdensome strain on social relationships (e.g., Buss, 1991a; Neeleman, Sytema, & Wadsworth, 2002). Even high conscientiousness, a trait rarely regarded as undesirable, may lead individuals to forgo unanticipated, but valuable opportunities. Importantly, this includes opportunities that could dramatically increase reproductive fitness, such as opportunistic short-term mating (Schmitt, 2004). Although high openness is associated with greater creativity, it is also associated with social withdrawal, delusional thoughts, and risk for schizophrenia and related disorders (McCreery & Claridge, 2002; Nettle, 2009). In short, the pursuit of any given personality strategy is associated with both potential benefits and potential costs (Buss, 1990; DeKay & Buss, 1992).

### 1.2. Cost–benefit tradeoffs: individual differences

The benefits of pursuing a given personality strategy depend on whether an individual faces the adaptive challenge the personality strategy is designed to help solve, how effective the strategy is in solving the adaptive problem for that particular individual, and the benefits that accrue to the individual by successfully solving the problem (Buss, 2009; Denissen & Penke, 2008; Nettle, 2006; Penke et al., 2007). The costs of the strategy depend on the potential costs inherent to the strategy itself (e.g., extraversion-associated injury risk) and the likelihood of the individual incurring those costs, as well as the opportunity costs to the individual – the benefits that the individual would obtain by pursuing an alternative strategy.

Crucially, these variables influencing the cost–benefit tradeoffs of a given personality strategy differ across individuals as a function of their *condition*. An organism's condition refers to its phenotypic quality (e.g., physical attractiveness, strength, see Lukaszewski & Roney, 2011), and reflects the organism's "ability to efficiently convert energy into fitness-enhancing traits and outcomes" (Lukaszewski, Larson, Gildersleeve, Roney, & Haselton, 2014), or "overall fitness budget" (Gangestad, Merriman, & Thompson, 2010; Tomkins, Radwan, Kotiaho, & Tregenza, 2004).

A condition-dependent evolutionary psychological model posits that species-typical psychological mechanisms take as input condition-linked cues predictive of differential costs and benefits of alternative personality strategies in ancestral conditions, and produce as output the personality strategy of greater probabilistic net benefit for the individual, given his or her condition (see Tooby & Cosmides, 1990 for their seminal theoretical discussion of this

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