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Toward a General Theory of Human Individual Differences: Can Evolutionary Psychology Meet the Challenge?

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In this article, we identify some of the major obstacles that have hindered the development of a general theory of individual differences in evolutionary psychology. These obstacles include inattention to particular types of individual differences and failure to consider new findings in fields such as behavior genetics, neuroscience, cultural psychology, and psychopathology. We also identify key challenges to developing an evolutionary psychological theory of individual differences, including Western, educated, industrialized, rich, and democratic-centric sampling and the variable impact of development and ecology on individual differences. We end with a discussion on how evolutionary psychology could meet the challenge of a general theory of individual differences by incorporating new methodologies, findings from other disciplines, and focusing on aspects of individual differences that have received little attention in the past.

Public Significance Statement

This study discusses the concept of a ‘general theory’ for individual human differences, and what such a theory would require. We argue that evolutionary psychology has the potential to meet these requirements and discuss the thresholds that have hindered it from doing so in the past. Moving forward, we propose a number of ways in which evolutionary psychologists could overcome these hurdles in the near future.

Keywords: evolutionary psychology, human nature, universality, individual differences, personality


Despite evolutionary psychology’s growth and success, a problem that has persisted into the present day is the discipline’s complex relationship with the issue of individual differences. Without a full account for individual human uniqueness and therefore for individual differences in psychological functioning and behavior, attempts toward a universal theory of

human nature would fall short on their own universality (e.g., Tooby & Cosmides, 1990).

Why Do We Need a General Theory of Individual Differences?

Individual humans differ from one another in many domains (Winemard, Winemard, & Boutwell, 2017). These include but are not limited to:

- Body size and shape, height and weight, and health.
- Emotional regulation and reactivity (temperament, stress reactivity, etc.) and their neurobiological and endocrinological substrates (noradrenergic and serotonergic systems, hypothalamus-pituitary-adrenal axis, etc.).

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- Sensitivity to reward and motivation, including sexual, affiliative, competitive, and parental motivation, and their neurobiological and endocrinological substrates (dopaminergic system, sex hormones, oxytocin, vasopressin, endogenous opioids, etc.).
- Intelligence and other aspects of cognitive function (intelligence quotient as a proxy for *g*, reaction time as a proxy for nerve conduction velocity, etc.).
- Personality, including social dispositions, interpersonal interactional styles, and so forth.

The absence of a general framework for understanding human individual differences leaves human knowledge in discord not only as to how individuals differ but also as to what these differences mean from a functional perspective. Moreover, as argued by Aldous Huxley many decades ago, a general theory of human individual differences is also necessary for human beings to be able to express their full potential; without knowing who we really are, we will always fall short in understanding what we can truly achieve (Huxley, 1946).

We argue that the following factors have been major hindrances to the development of a general theory of individual differences in evolutionary psychology:

First, evolutionary psychologists have been excessively attentive to certain aspects of individual differences while being inattentive toward others. For example, although human sexuality has been thoroughly investigated from an evolutionary perspective, evolutionary research on cognition and intelligence appears meager by comparison.

Second, evolutionary psychologists have failed to examine the components of individual differences that are broadly (but incorrectly) construed as outside the mind. The recent discovery of the role played by intestinal microbiota in serotonergic regulation has established the existence of a gut-brain axis through which gut flora are linked to the entire central nervous system at large (De Vadder et al., 2018; Malinova, Dijkstra, & de Vries, 2018). Such findings strongly support the notion of mind-body holism, which suggests that features of the mind cannot be decontextualized from those of the body and vice versa. For evolutionary psychology to flourish as a true science of human nature, it must venture beyond the mind and into

the body, considering not only the intestinal microbiome but also other systems such as the endocrine and immune systems.

Third, knowledge of individual differences in different domains has remained poorly integrated. Evolutionary psychology has failed to properly consider the findings produced by decades of research in behavior genetics as well as more recent research in physiology, neuroscience, and psychopathology (Kanazawa, 2011; Panksepp & Panksepp, 2000).

Finally, given that many human psychological and behavioral traits approximate normal distributions in many environments, most evolutionary research on individual differences has concentrated on variation around the mean but neglected the individuals at the extremes of the distribution. As such, little is known about individuals with exceptional or extreme manifestations of particular traits (e.g., personality or intelligence; Zabaneh et al., 2018).

Recent Challenges to a Theory of Individual Differences

One challenge to the evolutionary psychological research agenda, which is also relevant to the development of a theory of individual differences, is the issue of Western, educated, industrialized, rich, and democratic (WEIRD)-centric (Henrich, Heine, & Norenzayan, 2010) sampling practices and the concomitant failure of certain psychological measures to replicate when tested in non-WEIRD populations. A number of studies report the failure of extant models of personality such as the Five Factor Model (John, Donahue, & Kentle, 1991) and the General Factor of Personality Model (Figueredo, Woodley of Menie, & Jacobs, 2015) to produce reliable results when applied to many non-WEIRD populations (e.g., Alvergne, Jokela, & Lummaa, 2010; Bailey et al., 2013; Gurven, von Rueden, Massenkoff, Kaplan, & Lero Vie, 2013; Schmitt, Allik, McCrae, & Benet-Martínez, 2007; van der Linden et al., 2018).

In addition to the question of whether a comprehensive individual differences model can be universal or only population specific, there is a related problem involving the very ontology of stable, context-independent, individual differences on a more conceptual level. This issue of ontology has emerged primarily through devel-

opments in evolutionary and behavioral ecology as well as life history theory (Nettle & Frankenhuis, 2019; Nettle, Gibson, Lawson, & Sear, 2013). The life history literature, in particular, has been extensively related to the topic of individual differences. For instance, Figueredo et al. (2006) introduced a theoretical approach to life history orientation and personality that they experimentally supported using magnetic resonance imaging of several brain areas implicated in impulsivity and emotional control. Del Giudice (2018) has proposed a life history model that integrates personality, intelligence, and psychopathology along the fast-slow spectrum. Other studies have successfully explored associations between ethnocentrism (Dutton, Madison, & Lynn, 2016), sexuality (Jonason, Zeigler-Hill, & Hashmani, 2019) and other constructs in relation to personality and life history measures. Because life history calibration is believed to terminate around the time early adulthood is reached (Chisholm, 1999; Chua, Lukaszewski, Grant, & Sng, 2017), researchers have developed psychometric measures that estimate individual life history profiles by scoring test takers on a combination of early childhood experience and adult sociosexual behaviors (e.g., the Arizona Life History Battery; Figueredo et al., 2014, 2017). Even psychometric models such as the Arizona Life History Battery, however, can be challenged on the basis of recent findings that indicate that personality appears subject to continuous adaptive calibration in response to embodied capital (see below; Von Rueden, Lukaszewski, & Gurven, 2015). Thus, some research fundamentally questions the very concept of personality as a stable, situationally independent phenotypic feature of the organism.

How Evolutionary Psychology Could Meet the Challenge

Individual differences are less stable, more reactive, more context dependent, more mutable, and overwhelmingly more complex than is acknowledged by traditional personality models such as the Big Five. It has been argued that the limitations of the traditional approach taken by personality psychologists should be replaced by a more top-down approach grounded in ecology and evolution (e.g., Tooby & Cosmides, 2015). We also argue in favor of bottom-up approaches

that stem from recent advances in neuroscience, cognitive science, behavior genetics, endocrinology, and other biological subdisciplines. With bottom-up approaches, evolutionary psychologists can build models that draw on universal phenotypic traits like intelligence, homeostatic testosterone levels, and life history speed, even if these traits vary at local levels of analysis. As an analogy, consider that a biological anthropologist could build a model to predict the running patterns of any given individual based on that individual's profile in terms of universal features like leg length or size, even though there may be population-level differences in many aspects of leg anatomy or physiology (e.g., muscle mass or femur length).

We believe that the development of a general evolutionary theory of human individual differences should build on the growing evidence that brain connectivity and brain function are highly heterogeneous in human populations and that individuals whose brains are wired differently (in part because of their genetic makeup and in part because of their unique experiences with the environment) pursue fitness goals in different ways. For example, it is becoming increasingly apparent that individuals with autism spectrum disorder (ASD), from high-functioning individuals to those with serious impairments, are characterized by marked differences in sensory perception, cognition, emotion, and patterns of interactions with physical and non-physical entities, including reactivity to psychosocial stress and interpersonal style in relationships (e.g., Ponzi et al., 2016). These unique characteristics are not fully captured by traditional models of personality. Although some functional aspects of the ASD phenotype seem to fall within the slow category of life history strategy, a broader framework than both personality and life history theory seems necessary to fully understand the evolutionary basis of the ASD phenotype, including its more extreme manifestations.

Another aspect to be developed within a general theory of human interindividual variation is the differences in psychology and behavior between individuals who are born with extremely low and extremely high embodied capital. Embodied capital includes characteristics such as body size, height, nutritional status, physical attractiveness, health, intelligence, immune function, sex hormone levels, and emotion reg-

ulation (e.g., Von Rueden et al., 2015). Variation in embodied capital can be in part genetic, but it can also have a significant environmental basis, including nutrition, stress, and social support. It is very likely that individuals at the opposite ends of the embodied capital spectrum (who often exhibit extreme manifestations of personality profiles, mistakenly labeled as personality disorders) are characterized by markedly different patterns of interaction with the environment, including perception and interpretation of events, decision making, and social and reproductive strategies. A general theory of human individual differences that accounts for variation in embodied capital must include not only the genetic and environmental transmission of traits and microenvironments (e.g., the intergenerational transmission of intelligence, health, and social status) but also the patterns of assortative mating in human populations, which often result in individuals reproducing with partners of similar embodied capital (e.g., Robinson et al., 2017).

Given the important contributions that phenotype and environment make to individual differences, a growing number of researchers have argued for a more emergentist approach to individual differences, wherein personality trait factors arise from a combination of phenotype, the physical environment, and the social environment (e.g., Von Rueden et al., 2015). As an example of this approach, Lukaszewski, Gurven, von Rueden, and Schmitt (2017) have argued for the Socioecological Complexity Hypothesis of personality structure, a hypothesis that argues that personality trait covariance is shaped by local socioecological complexity. Supporting this hypothesis, Lukaszewski et al. (2017) found greater correlation between the five personality factors in societies with less diversity of socioecological niches. Also consistent with this hypothesis are the findings of an earlier study by Gurven et al. (2013), which reported a Big 2 personality configuration in the Tsimane forager-horticulturalists in Bolivia rather than the Big 5 commonly found in WEIRD societies.

Informed by these studies, Smaldino, Lukaszewski, von Rueden, and Gurven (2019) recently revisited the Socioecological Complexity Hypothesis and formalized it with a computational model in which individuals assort into various niches. This Niche-Diversity Hypothe-

sis argues that the complexity and diversity of niches—specific areas of an environment inhabited by an organism—lead to greater diversity of multivariate behavioral profiles, such as personality traits. The model illustrates how sorting into niches can induce variation in the number and structure of personality traits. In particular, more complex socioecologies result in a greater number of personality structures. The work by Smaldino et al. (2019) serves as an example of another area in which evolutionary psychologists lag behind other evolutionary disciplines—formal modeling (but see Conroy-Beam & Buss, 2016 for an example of computational modeling in mate selection).

Conclusions

Evolutionary psychology has the potential and the responsibility to produce a truly general theory of human interindividual variation in mental and behavioral processes. To succeed at this task, evolutionary psychology will need to embrace new findings in other disciplines, adopt new methodological tools, and focus more on what today appear as rare and extreme phenotypes (e.g., high intelligence, autism, and personality disorders).

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