
Following a review of evolutionary approaches to the five-factor model (FFM), I develop a synthetic perspective that incorporates three levels of analysis: personality systems as universal psychological mechanisms, systematic group (i.e., gender, birth order, age, ethnic) differences that can be illuminated by evolutionary theory, and individual differences. At the level of universal mechanisms, personality systems are species-typical systems with adaptive functions in the human environment of evolutionary adaptedness. At the level of group differences, the evolutionary theory of sex, parent-offspring conflict theory, and life history are used to analyze sex, age, and ethnic differences in personality systems. At the level of individual differences, variation in personality consists of a range of viable evolutionary strategies for humans. Humans evaluate and act on the genetic and phenotypic diversity represented by this range of viable strategies to solve adaptive problems. Evolutionary perspectives on cross-cultural variation are noted and illustrated.

EVOLUTION, CULTURE, AND THE FIVE-FACTOR MODEL

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An evolutionary perspective on personality raises fundamental questions about how evolutionists go about their business. Historically, the five-factor model (FFM), which is composed of five broad dimensions of personality (i.e., Surgency/Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience) thought to encompass most, if not all, personality traits, was not derived in an *a priori* manner. Rather, it was derived by subjecting sets of self-descriptions and other descriptions in the English language to factor analysis (Digman, 1996). The result is a set of language-specific factors that make up the most important dimensions of individual differences; important in the sense that the people developing that language have gone to the trouble to develop a “dense cluster of loosely synonymous terms” (Saucier & Goldberg, 1996, p. 26) to describe and often to evaluate the behavioral tendencies of self and others.

Given these origins, it is entirely conceivable that variation in particular traits would only be of interest within specific cultures. If this turns out to be

the case, an evolutionist could attempt to understand how individuals' standings on these various traits, as perceived by self or others, were related to variation in social status or mating opportunities, and therefore how these traits are related to achieving evolutionary goals within particular cultures. Also relevant would be studies linking the evolved design features of the human mind to the types of variation valued in particular cultures. However, there would be no implication that the types of variation humans find interesting are universal, and there would be no expectation that the variation itself would reflect variation in evolved mechanisms.

Although the above may be termed a weak evolutionary theory, a strong evolutionary perspective seeks evidence that the traits humans find interesting in self and others reflect variation in evolved systems that are universal among humans. Further, the strong version posits that information about this trait variation is universally interesting to humans in navigating their social environment and thereby solving adaptive problems. If that is the case, then it opens the way for a synthetic theory of personality. Following a review of evolutionary approaches to the FFM, I will develop a synthetic perspective that incorporates three levels of analysis: personality systems as universal psychological mechanisms, systematic group (i.e., gender, birth order, age, ethnic) differences that can be illuminated by evolutionary theory, and individual differences (see Table 1).

The strong version of an evolutionary approach posits universality of human interests and universality in the neurophysiological mechanisms underlying trait variation. It is important, therefore, to establish that there is considerable evidence for the universality of the FFM in diverse human languages. (In the absence of a rich adjectival repertoire reflecting the FFM space, it would be important to establish in some other manner that a culture attends to and considers FFM trait variation important information in evaluating self and others.) There is, in fact, considerable support for the widespread occurrence of the five-factor structure in natural languages. The "Big Five" have been isolated in American English (Goldberg, 1990), Dutch (De Raad, 1992), German (Ostendorf, 1990), Russian (Digman & Shmelyov, 1996), and Chinese (Trull & Geary, 1997), among other languages. The Big Five may well not constitute all of the evolved traits humans are interested in. As Buss (1996) notes, personality descriptors that are appropriate for only one sex (e.g., coy) have been systematically excluded in constructing the FFM, suggesting that the FFM does not tap variation in some evolved systems. Nevertheless, there is every indication that they constitute a set of traits that are universally embedded in human languages.

TABLE 1
Levels of an Evolutionary Perspective on Personality

Personality systems as universal psychological mechanisms
Personality systems as universal design features of humans homologous with similarly functioning systems in other vertebrates
System X Context interactions and compartmentalization
System X System interactions
System X Context X Trait interactions
System-specific environmental influences
Approaches to group differences in universal mechanisms based on evolutionary theory
The evolutionary theory of gender differences in personality
Age differences in personality systems
Evolution and birth order differences in personality
Life history theory and personality
Evolutionary perspectives on individual differences
Individual differences within the normal range as variation in viable strategies
Individual differences at the extreme ends of the normal range as maladaptive or high-risk strategies
Social evaluation: Individual differences in others' personalities as a resource environment
Self-evaluation and self-presentation of personality traits as mechanisms for maximizing one's resource value in the social environment

EVOLUTIONARY PERSPECTIVES ON THE FIVE-FACTOR MODEL

EVOLUTIONARY THEORY AND THE CIRCUMPLEX MODEL OF INTERPERSONAL DESCRIPTORS

The Circumplex Model of Interpersonal Descriptors results in two factors, labeled Dominance (related to Surgency/Extraversion) and Nurturance/Love (related to Agreeableness). These dimensions have been analyzed within an evolutionary framework (Trapnell & Wiggins, 1990; Wiggins & Trapnell, 1996; Wiggins, Trapnell, & Phillips, 1988). Dominance and Nurturance/Love are highly sex differentiated, and these authors note that evolutionary theory predicts that males and females would be expected to have different interests in negotiating status hierarchies (related to variation in Dominance) and in long-term intimate relationships (related to Nurturance/Love). This logic, which I believe is correct, is described more fully below.

HOGAN'S SOCIOANALYTIC THEORY

In agreement with many others, Hogan (1996) proposes that humans evolved as a group-living species in which negotiating status hierarchies and achieving social acceptance were of great importance for achieving reproductive success. Social interaction essentially involves exchange processes in which the currency is status and acceptance. However, these goals are in dynamic tension with each other. Increasing one's social status often comes at the expense of others, whereas conforming to others' desires (and thereby winning acceptance) results in diminished opportunities for success.

Hogan (1996) emphasizes that people observe others' behavior and develop theories about their behavioral tendencies. These perceptions constitute the reputation of the person, and one's reputation is an important resource. People manage their reputation and go to great lengths to protect their reputations. However, people also have a self-conception of their own personality that is partly a function of real behavioral tendencies influenced by individual differences in biological systems (temperament) and partly a function of their own idealized self-image, the latter subject to self-deception.

Nevertheless, Hogan's (1996) socioanalytic perspective minimizes the importance of neurophysiological systems. Instead, trait variation is substantially a product of a more or less skillful process of image management, and image management is fraught with deception and self-deception. Although everyone wants to receive social rewards from others, Hogan posits that humans do not, in general, behave in an adaptive manner and that people have varying success in manipulating their self-image to achieve social rewards.

People are not rational. Adults are typically unaware of the identities that guide their social behavior, and they are often careless about or indifferent to the manner in which others react to them. In addition, some people are more attentive to these processes than others. (Hogan, 1996, p. 168)

People are also constrained in the identities they adopt by the identities they are exposed to in their immediate environment.

On the other hand, others' ratings of one's personality are more or less true summaries of behavioral tendencies and together constitute one's reputation. As indicated above, Hogan (1996) places a great deal of emphasis on a person's reputation as central to personality psychology. Indeed, the FFM mainly concerns the structure of observer ratings of others, and people's

personality as revealed by others' FFM ratings constitutes their reputation in the eyes of others.

The FFM contains the categories that people use to evaluate one another; through the vehicle of reputation, these categories reveal the amount of status and acceptance that a person has been granted, and that he or she can normally expect to receive. A "reputation," defined in terms of the FFM, is an index of how well a person is doing in the game of life. Because the game, at a deep level, concerns reproductive success, it is ultimately quite serious. (Hogan, 1996, p. 173)

Individuals' standing on a particular trait is essentially a strategy for getting on in life but, because Hogan emphasizes traits as seen by others, it is also a barometer of usefulness to others. For example, people high on Prudence (Conscientiousness) are advertising their trustworthiness and dependability within the group.

THE THEORY OF DAVID BUSS

Buss (1996) notes that evolutionists suppose that natural selection has resulted in a complex array of mechanisms designed to solve adaptive problems. Many of these mechanisms are designed to navigate the social environment (e.g., finding a mate, raising children, and negotiating status hierarchies). Solving these adaptive problems involves attending to the differences among people (e.g., differences among potential leaders) rather than the universal features of human nature (e.g., having two legs). "Over evolutionary time, those individuals who attended to and acted on individual differences in others that were adaptively consequential would have survived and reproduced more successfully than those who were oblivious to adaptively consequential differences in others" (Buss, 1996, p. 185). As a result of this evolutionary logic, Buss (1996) proposes that natural selection has resulted in difference-detection mechanisms designed to evaluate individual differences in others.

Two general types of adaptive problems are *strategic interference* and *strategic facilitation*. Strategic facilitation involves solving adaptive problems related to finding allies, whereas strategic interference involves solving adaptive problems related to conflicts of interest with others. The FFM then identifies "in broad brush strokes" (Buss, 1996, p. 188) the dimensions of individual differences in others that must be assessed in determining the costs and benefits of pursuing particular strategies in a complex social environment. For example, individuals perceived as characterized by the positive

poles of the FFM dimensions of Conscientiousness and Agreeableness will generally be viewed as potential allies who can facilitate one's own adaptive strategizing, whereas those characterized by the negative poles of these dimensions will be associated with strategic interference.

People also use information about their own standing on personality dimensions to solve adaptive problems. Thus, a person high in surgency may be better able to solve problems involving groups by seeking a socially dominant role, whereas a person high in conscientiousness might develop a strategy of being dependable and reliable in performing tasks important for the group's success. Similarly, men high on surgency tend to retain mates by resource display tactics (e.g., spending money on the mate), whereas men low in surgency use debasement as a strategy (i.e., becoming inordinately submissive to the mate).

However, reflecting the importance of deception as a general evolutionary strategy, Buss (1996) proposes that ascriptions of traits to self and others may often be deceptive. People will tend to exaggerate positive traits to impress others and they will derogate potential rivals by exaggerating negative traits. Moreover, they do so in ways that are in accord with the evolutionary theory of sex differences. For example, women tend to value surgency and dominance in mates more than men do because men's position in the status hierarchy is a critical resource for men's mate value. Men are also more likely to exaggerate their accomplishments and portray themselves as successfully navigating social hierarchies while portraying their competitors as low on these traits.

A SYNTHETIC EVOLUTIONARY THEORY

PERSONALITY SYSTEMS AS UNIVERSAL PSYCHOLOGICAL MECHANISMS

In the following, I will attempt to weave together some of the insights of the above evolutionary perspectives into a synthetic evolutionary theory of personality and the FFM.

MacDonald (1991, 1995a) develops an evolutionary perspective on the two worlds of personality psychology: the world of universal psychological mechanisms and the world of individual differences. With other evolutionary theorists, the mind is conceptualized as a set of mechanisms designed by natural selection to solve adaptive problems. Although the social evaluation of individual phenotypic differences is indeed an important aspect of an evolutionary approach, at a fundamental level these mechanisms are concep-

tualized as adaptive systems that serve a variety of social and nonsocial functions in the environment of evolutionary adaptedness. This perspective expects to find homologous (i.e., inherited from a common ancestor) systems in animals that serve similar adaptive functions, and it expects that these systems will be organized within the brain as discrete neurophysiological systems. It also expects that each system will be responsive to particular environmental contexts (resulting in System X Context interactions) and that different personality systems will be in competition with each other within individuals, leading at times to psychological ambivalence.

Consider, for example, the behavioral approach systems, labeled here Dominance/Sensation Seeking, related to Surgency/Extraversion in the FFM and Dominance in the Circumplex Model of Interpersonal Descriptors. Dominance/Sensation Seeking consists of individual differences in social dominance as well as several other highly sex-differentiated, noninterpersonal approach behaviors, including sensation seeking, impulsivity, and sensitivity to reward. Being high on behavioral approach is also associated with aggressiveness and higher levels of sexual experiences. Just as the vertebrate eye was designed by natural selection to respond to the properties of light and the structure of surfaces as enduring and recurrent features of the environment, the behavioral approach personality systems are designed to motivate organisms to approach sources of reward (e.g., sexual gratification) that occurred as enduring and recurrent features of the environments in which humans evolved. Furthermore, just as creatures with highly sophisticated visual abilities were favored by natural selection because they were able to solve recurrent problems presented in navigating a three-dimensional world, the behavioral approach system served to promote biological fitness by motivating organisms to acquire resources, including sexual resources and social status, related to reproductive success. Finally, just as some individuals can see better than others, the fact that there is variation in the systems underlying vision is not incompatible with a functionalist interpretation of these systems viewed as normative, universal mechanisms. Barring severe organic visual impairment, all people have eyes with a lens that functions to regulate the amount of light entering the eye, but some individuals see better than others. Similarly, we all have behavioral approach systems conceptualized as universal human adaptations. However, because of genetic and environmental variation, some of us are more predisposed toward social dominance, reward seeking, sensation seeking, and so on, than others.

The adaptationist perspective proposes that the trait distributions of Conscientiousness/Behavioral Inhibition and Neuroticism (Affect Intensity) reflect phenotypic variation in systems that serve critical adaptive functions. Conscientiousness/Behavioral Inhibition functions to monitor the environ-

ment for dangers and impending punishments and to persevere in tasks that are not intrinsically rewarding but are important to fulfill long-range goals. Widiger and Trull (1992) find that the psychiatric disorder most associated with conscientiousness is obsessive-compulsive disorder, a disorder that tends to co-occur with a variety of phobic states and other anxiety disorders (e.g., Marks, 1987; Öhman, 1993). Gray (1982, 1987) has shown that anxiety is a critical emotion of obsessive-compulsive disorder. Phobias and obsessive-compulsive behavior are linked to the same systems because of the central role for anxiety in these disorders. From this perspective, the adaptive function of the Conscientiousness system is to check for possible threats emanating from the environment, including physical contamination, nonattainment of goals related to self-preservation, and other possible sources of danger and punishment.

Affect Intensity functions to mobilize behavioral resources by moderating arousal in acutely demanding situations in the service of both approach and avoidance behaviors. Affect Intensity may be viewed as a general behavioral "engine" that is used in the service of both behavioral approach and behavioral avoidance. It is a behavioral scaling system that allows the organism to scale its responses to current environmental opportunities and threats. Larsen and Diener (1987) note that emotionally intense individuals respond relatively strongly to emotional stimulation independent of the emotion involved, including both positive and negative emotions. Affect Intensity may be viewed as a generalized motivation-enhancement system that can be directed toward behavioral approach (Dominance/Sensation Seeking) as well as behavioral avoidance and checking for possible threats in the environment (Conscientiousness/Behavioral Inhibition). Individuals high on Affect Intensity are thus highly motivated to intensive interaction with the environment.

In addition, Nurturance/Love is proposed to underlie adaptive relationships of intimacy and other long-term relationships, especially family relationships involving reciprocity and transfer of resources to others (e.g., maternal and paternal investment in children), whereas the Openness to Experience factor taps variation in intelligence and what one might term optimal Piagetian learning—intrinsically motivated curiosity and interest in intellectual and aesthetic experience combined with imagination and creativity in these areas.

The functionalist account of the systems underlying the factor space of the FFM is strengthened by findings that individual differences in personality are associated with individual differences in physiological systems common to all humans. There is, in fact, considerable evidence linking personality systems with specific brain regions and neurochemicals (Eysenck, 1967, 1982; Gray, 1982, 1987; see reviews in MacDonald, 1988, 1995a). Moreover,

functionally and neurophysiologically similar systems are apparent in animal research (e.g., Gray, 1982, 1987). There is also evidence for personality traits in wolves (shyness/boldness, social dominance; MacDonald, 1983) and sunfish (shyness/boldness; Wilson, 1994) conceptually linked to FFM dimensions, and there is evidence that individual differences in personality among chimpanzees can be understood within the FFM framework (Figueredo & King, 1996; King & Figueredo, 1994).

Implications of the universalistic/systemic perspective: Interaction among personality systems. Some of the traditional problems of personality theory come into clearer focus within an evolutionary framework. Given that each system is a biological adaptation, each adaptation is responsive to its own set of environmental cues, thus resulting in what one might term System X Context interactions (MacDonald, 1995a). Thus, the Conscientiousness/Behavioral Inhibition system is triggered by perceptions of impending punishment or danger. People perceiving themselves to be in such situations experience emotions of fear and anxiety and they are motivated to alter the situation by, for example, removing or escaping from the danger. Behavioral Approach mechanisms may be externally cued, as when males perceive attractive, nubile, sexually receptive females, or they may be internally cued, as with a system such as Sensation Seeking in which individuals actively seek out exciting, stimulating, and even dangerous environments.

Cross-cultural variation in System X Context interactions is undoubtedly considerable. As an illustration, an important type of System X Context interaction is *compartmentalization*, that is, people can have radically different relationships with others depending on the context because different biological systems are involved (MacDonald, 1992, 1995a). One difficulty with developing an adaptationist perspective in personality is that there is no reason to suppose that the dimensions revealed by factor analysis map in a 1:1 manner with biological adaptations. In the case of Nurturance/Love, the opposite emotions of hostility and affection load on the same factor and the dimension itself ranges from individuals who are prone to affection and empathy to individuals prone to sociopathy and hostility. Watson and Clark's (1992) findings that hostility was not only negatively related to Agreeableness but also related more strongly to Agreeableness than to Neuroticism, in one sample, is particularly interesting. This suggests that this dimension reflects variation in two types of discrete emotion systems: affection/love/empathy and hostility. Because these are opposite emotions, this variation may not reflect a unitary biological system. Hostility as an emotion is linked to interpersonal aggression, whereas affection is associated with long-term relations of trust and intimacy.

It may well be that, in general, people who are highly prone to intimacy are not prone to interpersonal aggression and hostility (thereby accounting for the patterns found in factor analytic studies). However, there is every reason to suppose that they may be. A discrete systems perspective suggests that people may be prone to both of these emotions with the result that their relationships are compartmentalized. The ability to form close friendships and family relationships and to engage in high-investment parenting may be an important aspect of adaptation, but being able to compartmentalize one's relationships is also a highly important skill. The ability to engage in close family relationships would thus be highly compatible with engaging in purely instrumental behavior toward other individuals outside one's family or in-group, including behavior of an exploitative nature (see Trapnell & Wiggins, 1996). The result is System X Context interaction resulting from the fact that separately evolved systems associated with the same personality dimension can be recruited in different situations.

Data on cooperation and competition generally indicate that children are able to compartmentalize their relationships between settings (MacDonald, 1992). For example, the classic study of Sherif, Harvey, White, Hood, and Sherif (1961) showed that fostering competitive goals resulted in groups with strong in-group/out-group feelings. Reciprocated positive affective relationships within a group were not incompatible with a complete lack of empathy and high levels of brutality against outsiders and, in evolutionary terms, the prototypical in-group may be the family and other close relatives.

Cross-culturally, the importance of compartmentalization is expected to vary depending on whether the society tends toward individualism or collectivism in Triandis's (1995) sense. Individualism/collectivism constitutes a dimension of individual differences, with group (cross-cultural) differences in the trait resulting in differences between societies in the extent to which emphasis is placed on the goals and needs of the in-group, rather than on individual rights and interests. Collectivist cultures are characterized by highly compartmentalized in-group and out-group relationships. There is an "unquestioned attachment" (Triandis, 1990) to the in-group, including

the perception that ingroup norms are universally valid (a form of ethnocentrism), automatic obedience to ingroup authorities [i.e., authoritarianism], and willingness to fight and die for the ingroup. These characteristics are usually associated with distrust of and unwillingness to cooperate with outgroups. (Triandis, 1990, p. 55)

In collectivist cultures, morality is conceptualized as that which benefits the group, and aggression and exploitation of outgroups are acceptable (Triandis, 1990, p. 90). On the other hand, individualists are less compartmentalized.

They have more positive attitudes toward strangers and out-group members, and are more likely to behave in a prosocial, altruistic manner to strangers. People in individualist cultures are less aware of in-group/out-group boundaries and thus do not have highly negative attitudes toward out-group members (Triandis, 1991, p. 80).

Besides System X Context interactions, there can also be System X System interactions. For example, there is evidence for mutual inhibitory influences between the brain mechanisms underlying behavioral inhibition and behavioral approach. Mesulam (1986) describes reciprocal inhibition between the frontal and parietal lobes, the latter viewed as an approach system characterized by diffuse attention and impulsive responding. Tucker and Derryberry (1992) emphasize the inhibitory role of the frontal cortex. They note that individuals with frontal lesions are prone to impulsive responding and social disinhibition, as well as inadequate anticipation of aversive outcomes. Gray (1987) also notes reciprocal inhibitory influences between the behavioral inhibition system (BIS) and the reward-based approach systems. Gray notes that in rats, the inhibitory influences from the BIS are more powerful than the reverse, perhaps because the rat, as a prey species, is biased toward behavioral inhibition. Both systems may be aroused in particular situations, as when a previously rewarded behavior has been punished.

The model implied by the evolved systems perspective is, therefore, useful for conceptualizing conflicts between evolved systems as well as for situation specificity. For example, the behavioral approach associated with Dominance/Sensation Seeking and the behavioral avoidance systems associated with Conscientiousness/Behavioral Inhibition are psychometrically independent, implying that individuals can be more or less sensitive to immediate rewards and more or less sensitive to punishments and deferring gratification. Nevertheless, each system has inhibitory effects on the other system so that in a situation with both potentially immediate rewards as well as potentially greater long-range rewards achievable by delaying gratification, both systems are activated. Individuals high on Dominance/Sensation Seeking are highly attracted to immediate rewards and tend to engage in behavioral approach. In contrast, introverts, being less attracted to the potential rewards, are more likely to have approach tendencies inhibited by mechanisms underlying Conscientiousness and delay of gratification. A situation characterized overwhelmingly by potential long-range rewards activates the Conscientiousness system, even for individuals moderately high on Dominance/Sensation Seeking, whereas a situation characterized overwhelmingly by potential reward with no benefit to be attained by delaying gratification activates the reward/approach systems even for individuals who are highly conscientious. The result is what one might term System X Trait X Situation

variation, in which the system is understood as a universal mechanism responsive to particular perceived environmental contingencies and the trait represents individual differences in proneness to activating particular systems.

This perspective is also compatible with complementary and conflicting interactions between evolved motivational systems. Approach/Avoidance conflicts have been central to evolutionary perspectives beginning with the ethologists, but different evolved systems may also combine in influencing the phenotype and thus result in complementary motives. For example, Watson and Clark (1992) found that NEO-Achievement (NEO-PI-R; see Costa & McCrae, 1992) was related to positive affect and extraversion as well as the Dependability and Orderliness facets of Conscientiousness. One would expect that actual achievement would require not only ambition (desire for resources and social status related to behavioral approach) but also attention to detail, perseverance in the face of difficulty, the ability to adequately deal with possible threats, dependability, and perhaps orderliness (related to Conscientiousness). In general, a great many FFM adjectives load on secondary factors as well as a principal factor (Hofstee, De Raad, & Goldberg, 1992)—a finding that is here interpreted as indicating that these adjectives are shorthand descriptions for how a person stands on more than one evolved system.

A hierarchical model. Among humans, this conceptualization is compatible with Emmons's (1989) hierarchical model in which behavior related to personality occurs at several levels based ultimately on the motivating aspects of evolved personality systems (see Figure 1). For example, the emotions of anxiety and/or relief consequent to achieving safety are central to mechanisms designed to avoid perceived danger. Within Emmons's (1989) scheme, these emotions act as motive dispositions. People are able to engage in a wide range of low-level behaviors directed at approaching or avoiding these affective motive dispositions. Thus, humans are able to deduce imminent danger by using an elaborate array of open-ended, general-purpose, information-processing mechanisms and learning (e.g., uncovering an elaborate plot as a result of sophisticated knowledge of computers). This appraisal of imminent danger would then trigger the behavioral inhibition system, checking behaviors and feelings of anxiety. Humans are also able to devise a variety of flexible, open-ended strategies that are not highly channeled by evolutionary processes in an attempt to lower their anxiety (e.g., concocting an elaborate scheme to escape imminent danger).

The result is a hierarchical model in which the highest levels often involve affective goals subsumed by the evolved systems underlying the FFM—what

<u>Level 1</u>	EVOLVED MOTIVE DISPOSITIONS (Domain-Specific Mechanisms)
<u>Level 2</u>	PERSONAL STRIVINGS (Direct Psychological Effects of Domain-Specific Mechanisms)
<u>Level 3</u>	CONCERNS, PROJECTS, TASKS (Utilize Domain-General Mechanisms)
<u>Level 4</u>	SPECIFIC ACTION UNITS (Utilize Domain-General Mechanisms)

EXAMPLE:

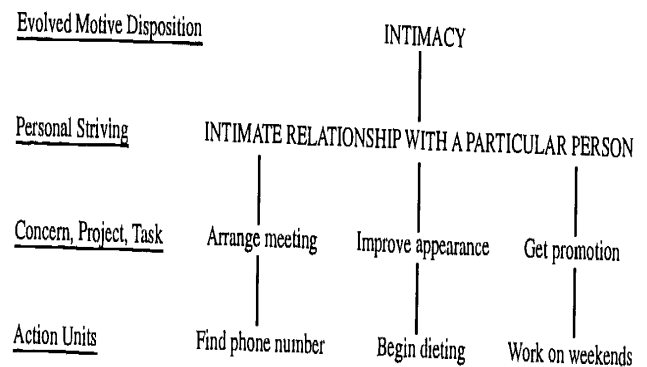


Figure 1: Hierarchical Model of Motivation Showing Relationships Between Domain-Specific and Domain-General Mechanisms

Source: Emmons (1989).

I have termed *evolved motive dispositions* (MacDonald, 1991). Such a perspective provides a robust role for general-purpose cognitive processes (e.g., schemata, tasks, and strategies; the *g* factor of IQ tests) used in attempting to achieve these goals as well as in evaluating situations relevant to affective goals. Secondly reinforcing rewards, such as money, would then be conceptualized as lower-level goals that can be used to facilitate the attainment of evolved motive dispositions at the highest level.

Although the evolved goals central to personality systems are expected to be universal, cultures differ in the means required to attain these goals. Thus, negotiating a marriage is very different depending on the presence of bride-wealth or dowry, whether polygyny is permitted, and whether parents control the marriages of children (typical of collectivist societies) or whether marriage is controlled by the individual (typical of individualist societies). General-purpose cognitive mechanisms (e.g., the *g* factor of IQ tests) are of critical importance in navigating cross-cultural variation in effective means of attaining evolved goals. Further, as indicated in the following, human groups differ on the mean level of evolved motive differences as a result of both genetic and environmental influences. Human groups evolving under

different environmental contingencies develop different levels of personality systems (see section on life-history theory) and cultures are able to manipulate environmental influences to maximize or minimize evolved personality systems (see the following section).

An evolutionary perspective on environmental influences. The results of behavior-genetic research indicate that environmental variation has considerable influence on phenotypic variation in personality, but with the exception of Agreeableness, there is no evidence that environmental variation is shared within families (e.g., Bouchard, 1997). Within an evolutionary systems perspective, environmental influences are conceptualized as involving specific types of stimulation directed at particular evolved systems. Thus, environmental influences affecting the Conscientiousness system would be expected to be events related to possible threats to personal safety or long-term goals, whereas environmental influences related to Nurture/Love would be expected to involve warmth and affection that typically occur in close family relationships.

For example, if indeed the psychobiology of the human affectional system underlying Agreeableness is a reward system that makes close relationships pleasurable (MacDonald, 1992), it is difficult to conceive how the primary source of environmental influences in the human affectional system, under normal circumstances, could be other than from adult caretakers—typically family members. If the relevant environmental stimulation is that which we label warm and affectionate, this type of stimulation is unlikely to come from other sources, at least during infancy and early childhood. Thus, it is not surprising that Agreeableness shows evidence of shared environmental influence (Bouchard, 1997; Tellegen et al., 1988). When it comes to being affectionate, parental warmth is, to a significant extent, an expression of a parental personality trait and therefore likely to be a general disposition of the parent. Although some children may be easier to love because of their own level of warmth and affection and some children may be less favored by parents because, for example, they are physically weak, all things being equal, warm parents are likely to treat all their children with a fairly similar level of affection, whereas cold, indifferent parents are likely to treat their children in a similar negative manner.

On the other hand, the behavioral genetic data indicate that environmental influences on other personality systems are unshared and thus are better conceptualized as coming from a variety of nonfamily sources as well as family influences that are not shared by siblings, such as birth order and gender. Environmental contexts relevant to the behavioral approach systems would often involve social dominance situations and reward-seeking and

risk-taking opportunities arising outside the family or in unshared situations within the family. For example, within the family, sibling-sibling competition may influence social dominance systems but would do so in a manner that would be unshared between siblings and perhaps lead to birth order effects as documented by Sulloway (1996). Similar comments could be made for conscientiousness/behavioral inhibition and affect intensity: Events that strengthen or weaken these systems may occur outside the family context, in schools and in neighborhoods where children are exposed to unshared environmental influences such as frightening events that affect one sibling and not another, different experiences with peers (e.g., bullies at school), and teachers with different expectations and effectiveness in influencing conscientiousness in their students.

Given the plasticity of human behavior, it is expected that cultures will attempt to shape evolved motive dispositions in an adaptive manner by manipulating environmental influences on evolved personality systems (MacDonald, 1988, pp. 142-153, 194-195, 224-228, 296-307). For example, in societies with low levels of economic production, sexual competition is relatively low and the affectional system functions as a mechanism of social cohesion. Socialization of children tends to emphasize warm parent-child and husband-wife relationships (e.g., Blain & Barkow, 1988; Draper & Harpending, 1988; Weisner, 1984). However, as societies become more economically productive, larger groups with higher levels of male sexual competition (as indicated by the prevalence of polygyny) and relationships of dominance and subordination tend to occur. The family becomes enmeshed in extensive kinship networks and children are socialized for aggression (a component of Dominance/Sensation Seeking) via hostile, rejecting parenting and the provision of physically aversive events. Further examples of cultural manipulation of environments influencing FFM traits are discussed in the conclusion.

APPROACHES TO GROUP DIFFERENCES IN UNIVERSAL MECHANISMS BASED ON EVOLUTIONARY THEORY

Sex differences in personality systems. Also adding to the plausibility of an evolutionary approach is the finding that sex differences within the five-factor space conform well to expectations resulting from the evolutionary theory of sex (MacDonald, 1988, 1991, 1995a; Trapnell & Wiggins, 1996; Wiggins, 1991). Factor rotations that maximize sex differences are most interesting to the evolutionist because we have a powerful evolutionary theory of sex differences. Evolutionary theory predicts that in species with sex-differentiated patterns of parental investment, the sex with the lower level of parental investment (typically the males) is expected to pursue a more high-

risk strategy compared to females, including being prone to risk taking, neophilia, and exploratory behavior. This follows because the high-investment sex (typically females) is expected to be able to mate relatively easily and is highly limited in the number of offspring (Trivers, 1972). However, mating is expected to be problematic for the low-investment sex, with the result that males must often compete with other males for access to females, whereas mating for females is much less problematic.

Mating for males is thus expected to be much more of a high-stakes enterprise, where successful risk taking has a much higher payoff than is the case with females. As a result, the evolutionary theory of sex makes predictions of sex-differentiated behavior that go well beyond expected differences in mating strategies and even social dominance to encompass a wide range of behaviors that influence resource acquisition. Males in general are expected to be higher than females on behavioral approach systems (including sensation seeking, risk taking, impulsivity, and social dominance) and lower on behavioral withdrawal systems (including caution and fear). Females are also expected and found to be higher on the Nurture/Love scale of the Circumplex model (Trapnell & Wiggins, 1996; Wiggins, 1991)—a point that will be returned to later in this article.

Theoretically expected sex differences in Sensation Seeking have been found cross-culturally in studies performed in America, England, Scotland, Thailand, and Japan (Zuckerman, 1979). These scales tap variation in attraction to physically dangerous activities and lack of fear of physical harm, promiscuous sexual activity, disinhibition, and susceptibility to boredom. In factor analytic studies, Sensation Seeking, like IAS-R-B5 (see Trapnell & Wiggins, 1990) DOM (Dominance), lines up between Extraversion-Sociability and the Eysenck Personality Questionnaire (EPQ) Psychoticism (Zuckerman, 1991), a measure that is conceptually associated with lack of nurturance and love. Indeed, Zuckerman (1984) notes that Sensation Seeking is associated with an "impulsive type of Extraversion" characterized by social dominance, surgency, and aggression. In accord with evolutionary expectations, men score significantly higher on the IAS-R-B5 DOM scale (Trapnell & Wiggins, 1990). Taken together, the data indicate a highly sex-differentiated interpersonal and noninterpersonal space tapped by IAS-R-B5 DOM and several central aspects of Sensation Seeking. MacDonald (1995a) reviews several other sex-differentiated aspects of the five-factor space, including affect intensity and certain facets of Conscientiousness.

Developmental changes in personality systems. The developmental trajectory of the behavioral approach systems also reflects evolutionary design. Developmentally, there is a pattern in which the most sexually differentiated

aspects of behavioral approach are maximized during late childhood and early adulthood whereas non-sex-differentiated aspects of behavioral approach appear early in infancy and are associated with positive emotionality. Sensitivity to reward emerges very early in life as a dimension of temperament and is independent of measures of behavioral inhibition, the latter system developing in the second half of the first year (Bates, 1989; Rothbart, 1989). Later in childhood, sociability has been linked to the more general trait of extraversion (Buss & Plomin, 1984; John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994), and such a relationship continues during adulthood.

Although there is little evidence for age changes during adulthood in NEO-PI-R (Costa & McCrae, 1992) Extraversion (McCrae & Costa, 1990), it is of interest that sensation seeking, including the promiscuous sexual activity loading on the Disinhibition subscale (Zuckerman, 1979), and aggression (Wilson & Daly, 1985) peak in late adolescence and young adulthood, followed by a gradual decline during adulthood. The cross-cultural prevalence of the young-male syndrome is highly compatible with evolutionary thinking: Sex-differentiated systems are expected to be strongest at the time of sexual maturation and maximum divergence of reproductive strategies. Because mating is theorized to be relatively problematic for males, it is during young adulthood, when males are attempting to establish themselves in the wider group and accumulate resources necessary for mating, that the male tendencies toward sensation seeking, risk taking, and aggression are expected to be at their peak.

Nevertheless, boys are higher on behavioral approach even during infancy in cross-cultural samples (see Rothbart, 1989 for a review), and sex differences in aggression (Eagly & Steffan, 1986), externalizing psychiatric disorders (conduct disorder, oppositional/defiant disorder), sensation seeking (Zuckerman, 1984), and rough-and-tumble play (often associated with aggression) can be seen beginning in early childhood (DiPietro, 1981; Humphreys & Smith, 1987; MacDonald & Parke, 1986; O'Brien & Huston, 1985). The social interactions of boys are also more characterized by dominance interactions and forceful, demanding interpersonal styles (Charlesworth & Dzur, 1987; Cowan & Avants, 1988; LaFrenière & Charlesworth, 1983; Savin-Williams, 1987).

Evolution and birth order effects. Sulloway (1996) provides evidence for modest birth order effects on the five-factor dimensions. Firstborns were found to be lower on Openness, higher on Conscientiousness, lower on Agreeableness, higher on negative emotionality (Neuroticism), higher on social dominance, and lower on sociability (a facet of Surgency/Extraversion

related also to Agreeableness). Sulloway emphasizes that behavioral genetic evidence indicates that unshared environmental influences account for approximately half of the phenotypic variation in personality. Birth order—conceptualized as a proxy for differences in age, size, power, status, and privilege—is proposed as the most important systematic unshared environmental influence on personality. Each child attempts to occupy a niche within the family. The oldest child occupies the first available niche, identifies more strongly with parents and with authority, and tends to reject new ideas. Younger children identify less with their parents and are more open to new experience and ideas.

Sulloway's (1996) evolutionary perspective draws on parent-offspring conflict theory (Trivers, 1974). Drawing on a wide range of data, including cross-cultural data, Sulloway shows that parents tend to favor older offspring because they have a higher reproductive value (i.e., they are closer to reproducing themselves), particularly in situations where resources are limited. This is theorized to increase firstborns' identification with adult values and to facilitate the Conscientiousness system. Because they share only half of their genes, siblings also have conflicts with each other over resources, and older siblings are typically able to dominate their younger siblings because of their advantages in size and strength. This strengthens the trait of Social Dominance. Subsequent-born children, on the other hand, resent this domination and develop a suite of strategies that enables them to occupy other niches within the family dynamic, including higher levels of sociability and agreeableness.

Life history theory and personality. Life history theory attempts to understand variation in the reproductive strategies adopted by different life forms. Life history theory implies considerable coherence to individual development because a reproductive strategy involves a coordinated response to the organism's environment resulting from the need to optimally partition mating effort (i.e., the effort expended in attracting mates) and parenting effort (i.e., the effort devoted to nurturing children). The fundamental dimension of reproductive strategies may be construed as a dimension that ranges from a high-parental-investment/low-mating-effort strategy to a low-parental-investment/high-mating-effort strategy.

A reproductive strategy involves a response to a central, external, ecological contingency that selects for optimum levels of partitioning mating effort and parenting effort. The result is that variables such as mortality rates, longevity, pair bonding, age of first reproduction, period of pre-adult dependency, and levels of paternal and maternal investment evolve as a coordinated response to the environment. Thus, for example, species adapted to environ-

ments where there is a relatively stable, predictable resource base tend to have a suite of traits allowing them to produce highly competitive offspring. Such species would be likely to have traits such as pair bonding between parents, high-investment parenting (including paternal provisioning of the young), low fertility, and delayed maturation of the young.

Theoretically, high-investment parenting is associated with adaptation to ecologically adverse or highly competitive environments where high levels of parental investment are critical to rearing successful offspring (Kleiman, 1977, 1981; Southwood, 1981). This makes intuitive sense because in ecologically adverse or highly competitive situations, male provisioning of food or other resources might tip the balance in favor of offspring compared to the offspring of males who do not provision their young. Indeed, several theorists have proposed that the adverse environment created by the Ice Age had an important role in shaping the intelligence and high-investment reproductive behavior of northern populations (Lynn, 1991; MacDonald, 1994; Miller, 1994a, 1994b; Rushton, 1995). Within this framework, natural selection resulted in a uniform tendency toward high-investment parenting as a result of long-term resource scarcity. Males who did not provision their young left few descendants. Therefore, long-term selection in resource-scarce environments is expected to lead to high-investment parenting.

In addition to ecologically adverse environments, highly competitive environments may also lead to high-investment parenting. Here, the theoretical focus has been on the *r/K* continuum of reproductive strategies. *r*-selected species evolve in response to highly unstable environments where there is little predictability of resource availability. These species adopt a low-investment/high-fertility reproductive strategy to take advantage of temporary situations where there are abundant resources and little competition. The low investment of relatively *r*-selected species is a response to a highly unpredictable resource environment in which there is selection for very rapid reproduction with little parental effort during the relatively short-lived periods of resource abundance. On the other hand, *K*-selected species evolve in response to a highly stable, predictable resource environment. These species adopt a high-investment/low-fertility strategy to compete with conspecifics and with other species (Southwood, 1981).

The data reviewed by Belsky, Steinberg, and Draper (1991) illustrate the utility of a life history perspective. They especially note the large intercorrelations among spousal harmony, parent-child relationship quality, children's interpersonal style, timing of puberty, sexual behavior, and level of parental investment. As indicated above, behaviors related to parental investment and reproduction are central to life history theory. The coherence of individual development also appears to involve measures of intelligence (e.g., Rushton,

1995) related to the Openness factor of the FFM. IQ is the single most powerful measure of individual differences psychologists have developed and is related to variation in a very wide range of human activities.

As indicated above, the Circumplex Model of Interpersonal Descriptors (Kiesler, 1983; Trapnell & Wiggins, 1990; Wiggins et al., 1988) results in a dimension of Nurturance/Love. Here, Nurturance/Love is proposed to underlie adaptive relationships of intimacy and other long-term relationships, especially family relationships, involving reciprocity and transfer of resources to others (e.g., maternal and paternal investment in children). Individual differences in warmth and affection observable in early parent-child relationships, including secure attachments, are conceptually linked with this dimension later in life (MacDonald, 1992). Secure attachments and warm, affectionate, parent-child relationships have been found to be associated with a high-investment style of parenting characterized by later sexual maturation, stable pair bonding, and warm, reciprocally rewarding, non-exploitative interpersonal relationships (Belsky et al., 1991).

Life history theory also offers a compelling tool for analyzing racial/ethnic differences in personality systems. As noted above, regarding the Ice Age as an important selective force in human evolution, different human groups have evolved under somewhat different environmental pressures. There is evidence that children from the Mongoloid gene pool are lower on affect intensity, less aggressive and disruptive, and more cooperative than Caucasian children (Brazelton, Robey, & Collier, 1969; Ekblad & Olweus, 1986; Freedman & Freedman, 1969; Orlick, Zhou, & Partington, 1990; Tremblay & Baillargeon, 1984). For adults, Vernon (1982), using a variety of standard personality instruments, found that Mongoloids were more introverted, more anxiety-prone, less aggressive, and lower on social dominance than Caucasians, whereas Rushton (1995), using the EPQ, found that Mongoloid samples were less extraverted and more neurotic than Caucasians. Also, noting various physical adaptations for extreme cold typical of Mongoloids, including flattened face, narrow eyes, shortened limbs, and the epicanthic fold, Lynn (1991) and Rushton (1995) have theorized that this suite of traits resulted from selection for behavioral restraint during the Ice Age.

EVOLUTIONARY PERSPECTIVES ON INDIVIDUAL DIFFERENCES IN PERSONALITY SYSTEMS

We have seen above that evolutionary perspectives on personality have highlighted the importance of the social evaluation of individual differences in personality. However, if indeed the evolved systems underlying human personality are homologous to systems that have an ancient history among

the vertebrates, it is reasonable to think more broadly about the role of individual differences. In general, personality distributions are conceptualized as subsuming more than one viable adaptive strategy (Belsky et al., 1991; Gangestad & Simpson, 1990; MacDonald, 1991; Wilson, 1994; see also discussion in Buss, 1991). This perspective proposes that personality variation represents a continuous distribution of phenotypes that matches a continuous distribution of viable strategies. Genetic variation in personality and other valued traits serves to facilitate the production of a wide range of variation (within a delimited range) that facilitates the occupation of a wide range of possible niches in the human and nonhuman environment.

There is abundant evidence that intraspecific genetic variation is associated with variation in habitat preference, and that genetic variation is linked with environmental heterogeneity and uncertainty (Futuyma & Moreno, 1988; Hedrick, 1986; Wilson, 1994). At different times, different parts of a personality distribution may be favored by natural selection resulting, for example, in separate niches for risk takers and risk avoiders. However, assuming fitness differences within the normal range of personality variation are not dramatic, the phenotypic distribution will be approximately normal and the fitness distribution will, in effect, be something of a plateau because there are no consistent forces of selection getting rid of variation over the great majority of the distribution.

In the case of personality systems, it is more likely that stabilizing selection (i.e., selection against extremes) rather than directional selection occurred. Individuals who are very high or very low on particular traits would appear to be at a disadvantage, but there is a broad range of genetic variation in the middle of the distribution underlying a range of viable strategies. Thus, this approach is highly consistent with attempts to conceptualize psychopathology in terms of maladaptive extremes on FFM dimensions (e.g., Costa & Widiger, 1994). On the other hand, some individuals extreme on FFM dimensions may also be seen as engaging in high-risk evolutionary strategies (MacDonald, 1995a). For example, several authors have noted that bipolar affective disorder is linked with creativity in normal or mildly affected relatives of psychiatrically impaired individuals (Andreassen, 1978; Richards, Kinney, Lunde, Henet, & Merzel, 1988), with creativity associated with the manic phase (Isen, Daubman, & Nowicki, 1987).

System X Context interactions may also result in cross-cultural variation in maladaptive behavior. Evolutionists have theorized that some psychopathology results from the differences between modern environments and the environments in which humans evolved (e.g., Nesse & Williams, 1996). For example, rates of depression may be influenced by contemporary trends

toward families removing themselves from close kinship ties as a source of social support. In addition, particular cultural contexts may render certain behavior as pathological and maladaptive even though it would be quite adaptive in a different cultural setting. For example, although there are exceptions, it has often been informally suggested that the behavior of children with Attention Deficit Hyperactivity Disorder tends to be maladaptive in contemporary societies where children are expected to adjust to educational settings. However, such children may be well adapted to life in societies where the aggressiveness and high energy level of these children would be valued traits.

Personality and social evaluation. The theories of Buss (1991) and Hogan (1996) emphasize the role of social evaluation of others' personalities as central to an evolutionary approach. There are good theoretical reasons to suppose that humans will be greatly interested in the genetic and phenotypic diversity represented by this range of viable strategies. As Buss (1991) notes, personality is an adaptive landscape in which "perceiving, attending to, and acting upon differences in others is crucial for solving problems of survival and reproduction" (p. 471).

Individual genetic and phenotypic variation constitutes the playing field on which the evolutionary game is played. Evolutionary theory implies that organisms will be keenly interested in genetic variation and its expression in a wide array of phenotypic traits. There is good evidence that mechanisms that appraise the resource value of this variation have evolved. For example, the phenomenon of female-mate choice, proposed originally by Darwin as a mechanism of sexual selection, implies mechanisms for the discrimination of phenotypic (and ultimately genetic) variants (see Andersson, 1994). Indeed, evolutionary approaches to sexual behavior imply evolved mechanisms that assess variation in a large number of traits. Thus, Buss (1994) provides cross-cultural evidence that females prefer males who control resources and are willing to invest themselves in the woman's children. In addition, women prefer men who are intelligent, kind, healthy, physically strong, dependable, emotionally stable, ambitious, tall, and somewhat older than themselves. The evolutionary perspective on such mechanisms—which is strongly supported by cross-cultural research (Buss, 1994)—implies the evolution of mechanisms for detecting and evaluating individual differences in a wide range of traits.

Hogan's (1996) socioanalytic theory, discussed above, emphasizes social evaluation as central to personality psychology. Individual differences in personality are thus viewed as indicators of whether individuals are suited for particular roles. Each individual is expected to not only appraise the

phenotypic traits of others but to evaluate these traits differentially depending on the type of relationship entered into. Thus, Graziano and Ward (1992) found that teachers perceived a stronger association between Conscientiousness and school adjustment than did school counselors, a finding that presumably reflects the greater interest teachers have in this trait as a component of children's adjustment.

Similarly, Lusk, MacDonald, and Newman (in press) found that ideal leaders were expected to be higher than ideal friends in scales intended to tap variation in physical attractiveness, intelligence, conscientiousness, activity, and sociability, but lower in emotionality and disabilities—a trait profile that presumably reflects individuals' criteria for being a good leader. Ideal friends, on the other hand were expected to be higher than prospective ideal leaders in athletic ability and Intimacy/Warmth—traits that are presumably more important for a successful friendship. Moreover, subjects expected ideal friends to be more similar to themselves than to ideal leaders, and subjects rated themselves as more similar to ideal leaders and ideal friends on categories that they rated highly.

Finally, DeKay and Buss (see Buss, 1996) show that people use different criteria in choosing ideal mates, coalition partners, and friends. Descriptors associated with each of the FFM dimensions were rated as important for each of these relationships, but different descriptors were said to be important for different relationships. Thus, for example, descriptors related to surgency were important for all three types of relationships, but they differed somewhat depending on the particular relationship involved. People desired ambition, boldness, self-confidence, and exceptional leadership in a coalition partner, whereas they desired self-confidence and ambition in a long-term mate and boldness, self-confidence, and ambition in a friend. People also desired kindness much more in a potential mate than a coalition partner.

Although there is a substantial universality of human interests involved in mate choice (Buss 1994), cultures certainly differ in the extent to which particular traits are valued. For example, traditional Jewish cultures placed high value on intelligence, conscientiousness, and resource acquisition ability (MacDonald 1994). On the other hand, a great many societies, for example, the ancient Spartans, have valued military virtues (see below).

Because social evaluation looms so large in human affairs, an evolutionist fully expects that deception and self-deception will be important aspects of personality (Buss, 1996; Hogan, 1996). Self-presentation is aimed at maximizing one's resource value in the social environment, facilitating goal attainment (strategic facilitation; Buss, 1996), and interfering with competitors' goals (strategic interference; Buss, 1996). The material illustrating and supporting these ideas was summarized earlier in this article.

CONCLUSION: CULTURE AND THE FIVE-FACTOR MODEL

The purpose of this concluding section is to summarize the ways in which cross-cultural variation impinges on personality psychology and to discuss evolutionary perspectives on cross-cultural variation. A principal focus of this article has been to highlight the two worlds of evolutionary personality psychology—the world of universal psychological mechanisms as a set of adaptations and the world of individual differences as a continuous distribution of viable alternate strategies. The universality of the mechanisms underlying personality psychology reflect a fundamental similarity of human interests related to negotiating status hierarchies, affiliating with others, persevering in long-term goals, and so on.

However, we have seen that cultures evolving under differing ecological conditions may develop different mean levels of these universal systems, and cultures may manipulate environmental influences to affect the mean level of particular personality systems. Moreover, cross-cultural differences in the current ecological context of a society provide different contexts for pursuing these universal interests, and cultures may differ on the traits that are valued most highly.

Evolutionists have developed several approaches to conceptualizing cross-cultural variation, including co-evolutionary theories emphasizing both genetic and cultural inheritance systems; evolutionary psychology theories in which cultural variation results from universal, domain-specific, psychological adaptations interacting with different ecological contexts; and behavioral ecological theories linking environmental context with behavior that is flexibly responsive to immediate environmental demands by using domain-general learning mechanisms (see Flinn, 1997, for a review).

Different aspects of culture may be better analyzed with one or another of these theories because in practice, it is difficult to distinguish among them (Flinn, 1997). Different aspects of the synthetic evolutionary perspective on personality psychology developed here are compatible with different theoretical perspectives on cultural variation. Dual inheritance theories allow for “arms races” between evolved psychological mechanisms and cultural traits, “with cultural traits that remain attractive to psychological mechanisms being saved, while psychological mechanisms evolve to select adaptive cultural traits” (Flinn 1997, p. 41). Thus, one might imagine a cultural trait, such as a novel weapon that gives an advantage in warfare. Such a cultural invention could spread rapidly because groups using it would be able to subjugate groups that did not use it. The invention would be attractive to evolved mechanisms underlying personality because, for example, it would allow

males to control large numbers of females, obtain resources, and so on related to the behavioral approach systems. Work in this tradition has not focused on personality psychology, but there is every reason to suppose that evolved personality systems are involved in the evaluation of cultural inventions.

The evolutionary psychology approach emphasizes System X Context interactions as central to understanding cultural variation (Tooby & Cosmides, 1992). However, the empirical focus of this approach has been to catalog human universals (viewed as a set of universal, domain-specific, psychological mechanisms that evolved in response to a relatively uniform pan-human environment of evolutionary adaptedness [EEA]). Explicit proposals for linking cross-cultural variation to System X Context interactions have been lacking. Moreover, this approach ignores individual differences in psychological mechanisms and their role in social evaluation that are so central to personality psychology.

The synthetic theory developed here is most compatible with behavioral ecological theories (Alexander, 1990; Flinn, 1997; MacDonald, 1991). Unlike the evolutionary psychologists who base their theory exclusively on domain-specific cognitive processes that evolved in a relatively uniform EEA, behavioral ecological approaches emphasize the variability of the environments in which humans evolved. Moreover, the human mind is conceptualized as having been designed to adapt to novelty and uncertainty via relatively domain-general processes like social learning and the *g* factor of IQ testing. There is an emphasis on hierarchical decision processes and motivational structures linking domain-specific mechanisms to domain-general mechanisms (see Figure 1). Behavioral ecologists also emphasize developmental processes, including the roles of developmental plasticity and environmental influences in creating phenotypic variation that is an adaptive response to particular ecological contexts. Finally, the behavioral ecological approach is compatible with an emergent role for within-group political processes that ultimately influence personality development but are underdetermined by evolutionary theory (MacDonald, 1988, pp. 289-312; 1990; 1995b).

This approach can be illustrated by briefly considering two contrasting cultures: the ancient Spartans and traditional Ashkenazi Jewish culture. Although the cohesiveness of these groups was likely influenced by evolved systems underlying the formation of collectivist groups (MacDonald, 1994), group strategies are conceptualized as “experiments in living” made possible by flexible, domain-general, cognitive processes. These processes play a critical role in developing viable strategies capable of navigating complex, variable, and uncertain human environments.

Both of these cultures had highly elaborated practices for socializing children derived from a clearly articulated, group-evolutionary strategy. In the case of the Spartans, children were taken away from the family at age 8 and socialized by the state (see MacDonald, 1988, pp. 301-304). Taking advantage of the proximal mechanisms underlying the development of aggression, children were subjected to a rather brutal disciplinary regimen designed to produce highly aggressive warriors. Social evaluation within the society emphasized personality traits related to military virtues (e.g., courage, leadership, self-sacrifice for the group). Relationships were highly compartmentalized, with in-group relationships characterized by warmth and altruism and out-group relationships characterized by exploitation and brutality.

In the case of traditional Askenazi society, child-rearing practices were prescribed by the group (MacDonald, 1994, pp. 176-219). Particular attention was paid to educational practices designed to maximize intelligence, conscientiousness, and high levels of group allegiance and within-group altruism. Individuals high on these characteristics were held in very high social esteem, were able to enter into advantageous marriages, and have a higher level of reproductive success. There was a complete de-emphasis on military virtues, such as physical aggression, until the recent emergence of Zionism—a good example of a shift in the social desirability of personality variation. Social relationships were highly compartmentalized between in-group and out-group and parent-child relationships.

I conclude that an evolutionary perspective is able to make theoretical sense of much of the FFM literature as well as provide personality psychology in general with a very broad theoretical foundation. A particular advantage is that an evolutionary perspective is able to provide a deductive basis for personality research. Subtheories within the evolutionary framework, such as the theory of sex differences, parent-offspring conflict theory, and life history theory, are able to provide a predictive basis for personality psychology—predictive in the sense that the patterns actually found are embedded in a much wider theoretical framework that ultimately links psychology to the natural sciences.

Further research is needed to specify the systems and subsystems within the FFM space at the level of brain mechanisms. A clear understanding of the adaptations underlying personality at the physiological level would provide a firm basis for personality psychology. One can foresee a future when personality psychology is firmly grounded in physiological mechanisms resulting in theoretically predicted patterns of personality. At a higher level, research would show how people develop a self-image of their personality and how they attempt to manage their behavior to influence their reputations. At an even higher level, we can examine how different cultures frame these

evolved mechanisms by developing somewhat different lexical contexts for them and how different reward structures develop for different patterns of personality.

REFERENCES

- Alexander, R. D. (1990). Epigenetic rules and Darwinian algorithms: The adaptive study of learning and development. *Ethology and Sociobiology*, *11*, 1-63.
- Andersson, M. (1994). *Sexual selection*. Princeton, NJ: Princeton University Press.
- Andreasen, N. C. (1978). Creativity and psychiatric illness. *Psychiatric Annals*, *8*, 113-119.
- Bates, J. E. (1989). Concepts and measures of temperament. In G. A. Kohnstamm, J. E. Bates, & M. K. Rothbart (Eds.), *Temperament in childhood* (pp. 3-26). Chichester, UK: Wiley.
- Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Child Development*, *62*, 647-670.
- Blain, J., & Barkow, J. (1988). Father involvement, reproductive strategies, and the sensitive period. In K. MacDonald (Ed.), *Sociobiological perspectives on human development* (pp. 373-396). New York: Springer-Verlag.
- Bouchard, T. J. Jr. (1997). The genetics of personality. In K. Blum, & E. P. Noble (Eds.), *Handbook of psychiatric genetics* (pp. 267-290). Boca Raton, FL: CRC Press.
- Brazelton, T. B., Robey, J. S., & Collier, G. A. (1969). Infant development in the Zinacanteco Indians of southern Mexico. *Pediatrics*, *44*, 274-290.
- Buss, A. H., & Plomin, R. (1984). *Temperament: Early developing personality traits*. Hillsdale, NJ: Lawrence Erlbaum.
- Buss, D. M. (1991). Evolutionary personality psychology. *Annual Review of Psychology*, *42*, 459-491.
- Buss, D. M. (1994). *The evolution of desire*. New York: Basic Books.
- Buss, D. M. (1996). Social adaptation and five major factors of personality. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 180-207). New York: Guilford.
- Charlesworth, W., & Dzur, C. (1987). Gender comparisons of preschoolers' behavior and resource utilization in group problem solving. *Child Development*, *58*, 191-200.
- Costa, P. T., & McCrae, R. R. (1992). *NEO-PI-R Professional Manual*. Orlando, FL: PAR, Inc.
- Costa, P. T., & Widiger, T. A. (1994). Summary and unresolved issues. In P. T. Costa & T. A. Widiger (Eds.), *Personality disorders and the five-factor model of personality* (pp. 226-241). Washington, DC: American Psychological Association.
- Cowan, G., & Avants, S. K. (1988). Children's influence strategies: Structure, sex differences, and bilateral mother-child influences. *Child Development*, *59*, 1303-1313.
- De Raad, B. (1992). The replicability of the Big Five personality dimensions in three word classes of the Dutch language. *European Journal of Personality*, *6*, 15-29.
- Digman, J. M. (1996). The curious history of the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 1-20). New York: Guilford.
- Digman, J. M., & Shmelyov, A. G. (1996). The structure of temperament and personality in Russian children. *Journal of Personality and Social Psychology*, *71*, 341-351.
- DiPietro, J. A. (1981). Rough-and-tumble play: A function of gender. *Developmental Psychology*, *17*, 50-58.

- Draper, P., & Harpending, H. (1988). A sociobiological perspective on the development of human reproductive strategies. In K. MacDonald (Ed.), *Sociobiological perspectives on human development* (pp. 340-372). New York: Springer-Verlag.
- Eagly, A. H., & Steffan, V. J. (1986). Gender and aggressive behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, *100*, 283-308.
- Ekblad, S., & Olweus, D. (1986). Applicability of Olweus' Aggression Inventory in a sample of Chinese primary school children. *Aggressive Behavior*, *12*, 315-325.
- Emmons, R. A. (1989). The personal striving approach to personality. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 87-126). Hillsdale, NJ: Lawrence Erlbaum.
- Eysenck, H. J. (1967). *The biological basis of personality*. Springfield, IL: Charles C Thomas.
- Eysenck, H. J. (Ed.). (1982). *Personality, genetics, and behavior*. New York: Praeger.
- Figueredo, A. J., & King, J. E. (1996). The evolution of individual differences in behavior. *Western Comparative Psychological Association Observer*, *2*(2), 1-4.
- Finn, M. (1997). Culture and the evolution of social learning. *Evolution and Human Behavior*, *18*, 23-67.
- Freedman, D. J., & Freedman, N. C. (1969). Behavioral differences between Chinese American and European American newborns. *Nature*, *224*, 1227.
- Futuyma, D. J., and Moreno, G. (1988). The evolution of ecological specialization. *Annual Review of Ecology and Systematics*, *20*, 207-233.
- Gangestad, S. W., & Simpson, J. A. (1990). Toward an evolutionary history of female sociosexual variation. *Journal of Personality*, *58*, 69-96.
- Goldberg, L. R. (1990). An alternative description of personality: The Big Five factor solution. *Journal of Personality and Social Psychology*, *59*, 1216-1229.
- Gray, J. A. (1982). *The neuropsychology of anxiety*. New York: Oxford University Press.
- Gray, J. A. (1987). *The psychology of fear and stress*. Cambridge, UK: Cambridge University Press.
- Graziano, W. G., & Ward, D. (1992). Probing the Big Five in adolescence: Personality and adjustment during a developmental transition. *Journal of Personality*, *60*, 425-439.
- Hedrick, P. W. (1986). Genetic polymorphism in heterogeneous environments. *Annual Review of Ecology and Systematics*, *17*, 535-566.
- Hofstee, W.K.B., De Raad, B., & Goldberg, L. R. (1992). Integration of the Big Five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, *63*, 146-163.
- Hogan, R. (1996). A socioanalytic perspective on the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 163-179). New York: Guilford.
- Humphreys, A. P., & Smith, P. K. (1987). Rough and tumble, friendship, and dominance in school children: Evidence for continuity and change with age. *Child Development*, *58*, 201-212.
- Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology*, *52*, 1122-1131.
- John, O. P., Caspi, A., Robins, R. W., Moffitt, T. E., & Stouthamer-Loeber, M. (1994). The "Little Five": Exploring the nomological network of the five-factor model personality in adolescent boys. *Child Development*, *65*, 160-178.
- Kiesler, D. J. (1983). The 1982 interpersonal circle: A taxonomy for complementarity in human transactions. *Psychological Review*, *90*, 185-214.
- King, J. F., & Figueredo, A. J. (1994, April). *Human personality factors in zoo chimpanzees?* Paper presented at the Western Psychological Association Convention, Kona, HI.
- Kleiman, D. G. (1977). Monogamy in mammals. *Quarterly Review of Biology*, *52*, 39-69.
- Kleiman, D. G. (1981). Correlations among life history characteristics of mammalian species exhibiting two extreme forms of monogamy. In R. D. Alexander & D. W. Tinkle (Eds.), *Natural selection and social behavior* (pp. 332-344). New York: Chiron.
- LaFrenière, P. J., & Charlesworth, W. R. (1983). Dominance, affiliation and attention in preschool group: A nine-month longitudinal study. *Ethology and Sociobiology*, *4*, 55-67.
- Larsen, R. J., & Diener, E. (1987). Affect intensity as an individual difference characteristic: A review. *Journal of Research in Personality*, *21*, 1-39.
- Lusk, J., MacDonald, K., & Newman, J. R. (in press). Resource appraisals among self, friend, and leader: Implications for an evolutionary perspective on individual differences and a resource/reciprocity perspective on friendship. *Personality and Individual Differences*.
- Lynn, R. (1991). The evolution of racial differences in intelligence. *Mankind Quarterly*, *32*, 99-173.
- MacDonald, K. B. (1983). Stability of individual differences in behavior in a litter of wolf cubs (*Canis lupus*). *Journal of Comparative Psychology*, *2*, 99-106.
- MacDonald, K. B. (1988). *Social and personality development: An evolutionary synthesis*. New York: Plenum.
- MacDonald, K. B. (1990). Mechanisms of sexual egalitarianism in Western Europe. *Ethology and Sociobiology*, *11*, 195-238.
- MacDonald, K. B. (1991). A perspective on Darwinian psychology: Domain-general mechanisms, plasticity, and individual differences. *Ethology and Sociobiology*, *12*, 449-480.
- MacDonald, K. B. (1992). Warmth as a developmental construct: An evolutionary analysis. *Child Development*, *63*, 753-773.
- MacDonald, K. B. (1994). *A people that shall dwell alone: Judaism as a group evolutionary strategy*. Westport, CT: Praeger.
- MacDonald, K. B. (1995a). Evolution, the five-factor model, and levels of personality. *Journal of Personality*, *63*, 525-567.
- MacDonald, K. B. (1995b). The establishment and maintenance of socially imposed monogamy in Western Europe. *Politics and the Life Sciences*, *14*, 3-23.
- MacDonald, K. B., & Parke, R. D. (1986). Parent-child physical play: The effects of sex and age of children and parents. *Sex Roles*, *15*, 367-378.
- Marks, I. (1987). *Fears, phobias, and rituals: Panic, anxiety, and their disorders*. Oxford, UK: Oxford University Press.
- McCrae, R. R., & Costa, P. T. (1990). *Personality in adulthood*. New York: Guilford.
- Mesulam, M. M. (1986). Frontal cortex and behavior. *Annals of Neurology*, *19*, 320-325.
- Miller, E. M. (1994a). Paternal provisioning versus mate seeking in human populations. *Personality and Individual Differences*, *17*, 227-255.
- Miller, E. M. (1994b). Optimal adjustment of mating effort to environmental conditions: A critique of Chisholm's application of life history theory, with comments on race differences in male paternal investment strategies. *Mankind Quarterly*, *34*, 297-316.
- Nesse, R. M., & Williams, G. C. (1996). *Why we get sick: The new science of Darwinian medicine*. New York: Vintage.
- O'Brien, M., & Huston, A. C. (1985). Development of sex-type play in toddlers. *Developmental Psychology*, *21*, 866-871.
- Öhman, A. (1993). Fear and anxiety as emotional phenomena: Clinical phenomenology, evolutionary perspectives, and information-processing mechanisms. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 511-536). New York: Guilford.
- Orlick, T., Zhou, Q., & Partington, J. (1990). Cooperation and conflict within Chinese and Canadian kindergarten settings. *Canadian Journal of Behavioural Sciences*, *22*, 20-25.

- Ostendorf, F. (1990). *Sprache und persoennlichkeitsstruktur: Zur validataet des funf-faktoren modells der persoennlichkeit* [Language and personality structure: On the validity of the five-factor model of personality]. Regensburg, Germany: S. Roderer Verlag.
- Richards, R., Kinney, D. K., Lunde, I., Henet, M., & Merzel, A.P.C. (1988). Creativity in manic-depressives, cyclothemes, their normal relatives, and control subjects. *Journal of Abnormal Psychology, 97*, 281-288.
- Rothbart, M. K. (1989). Temperament in childhood: A framework. In G. A. Kohnstamm, J. Bates, & M. K. Rothbart (Eds.), *Temperament in childhood* (pp. 59-73). Chichester, UK: Wiley.
- Rushton, J. P. (1995). *Race, evolution, and behavior*. New Brunswick, NJ: Transaction.
- Saucier, G., & Goldberg, L. R. (1996). The language of personality: Lexical perspectives on the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 21-50). New York: Guilford.
- Savin-Williams, R. (1987). *Adolescence: An ethological perspective*. New York: Springer-Verlag.
- Sherif, M., Harvey, O., White, B. J., Hood, W. R., & Sherif, C. (1961). *Intergroup conflict and cooperation: The robbers' cave experiment*. Norman: University of Oklahoma Press.
- Southwood, T.R.E. (1981). Bionomic strategies and population parameters. In R. M. May (Ed.), *Theoretical ecology: Principles and applications* (pp. 30-52). Sunderland, MA: Sinauer Associates.
- Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. New York: Pantheon.
- Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Segal, N., & Rich, S. (1988). Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology, 54*, 1031-1039.
- Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In G. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 3-136). New York: Oxford University Press.
- Trapnell, P. D., & Wiggins, J. S. (1990). Extension of the Interpersonal Adjective Scales to include the Big Five dimensions of personality. *Journal of Personality and Social Psychology, 59*, 781-890.
- Trapnell, P. D., & Wiggins, J. S. (1996). A dynamic-interactional perspective on the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 89-162). New York: Guilford.
- Tremblay, R. E., & Baillargeon, L. (1984). Les difficultés de comportement d'infants immigrants dans les classes d'accueil, au préscolaire. *Canadian Journal of Education, 9*, 154-170.
- Triandis, H. C. (1990). *Cross-cultural studies of individualism and collectivism*. Nebraska Symposium on Motivation: Cross Cultural Perspectives. Lincoln: University of Nebraska Press.
- Triandis, H. C. (1991). Cross-cultural differences in assertiveness/competition versus group loyalty/cohesiveness. In R. A. Hinde & J. Groebel (Eds.), *Cooperation and prosocial behavior* (pp. 78-88). Cambridge, UK: Cambridge University Press.
- Triandis, H. C. (1995). *Individualism and collectivism*. Boulder, CO: Westview.
- Trivers, R. (1972). Parental investment and sexual selection. In R. Campbell (Ed.), *Sexual selection and the descent of man* (pp. 136-179). Chicago: Aldine-Atherton.
- Trivers, R. (1974). Parent-offspring conflict. *American Zoologist, 14*, 249-264.
- Trull, T. J., & Geary, D. C. (in press). Comparison of the Big Five factor structure across samples of Chinese and American adults. *Journal of Personality Assessment*.
- Tucker, D. M., & Derryberry, D. (1992). Motivated attention: Anxiety and the frontal executive functions. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology, 5*, 233-252.
- Vernon, P. E. (1982). *The abilities and achievements of Orientals in America*. New York: Academic Press.
- Watson, D., & Clark, L. A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality, 60*, 441-476.
- Weisner, T. S. (1984). Ecocultural niches of middle-childhood: A cross-cultural perspective. In W. A. Collins (Ed.), *Development during middle childhood: The years from 6 to 12* (pp. 335-369). Washington DC: National Academy Press.
- Widiger, T. A., & Trull, T. J. (1992). Personality and psychotherapy: An application of the five-factor model. *Journal of Personality, 60*, 363-393.
- Wiggins, J. S. (1991). Agency and communion as conceptual coordinates for the understanding and measurement of interpersonal behavior. In W. M. Grove & D. Cicchetti (Eds.), *Thinking clearly about psychology: Vol. 2. Personality and psychopathology* (pp. 217-238). Minneapolis: University of Minnesota Press.
- Wiggins, J. S., & Trapnell, P. D. (1996). A dyadic-interactional perspective on the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 88-162). New York: Guilford.
- Wiggins, J. S., Trapnell, P., & Phillips, N. (1988). Psychometric and geometric characteristics of the revised Interpersonal Adjective Scales (IAS-R). *Multivariate Behavioral Research, 23*, 517-530.
- Wilson, D. S. (1994). Adaptive genetic variation and human evolutionary psychology. *Ethology and Sociobiology, 15*, 219-235.
- Wilson, M. A., & Daly, M. (1985). Competitiveness, risk taking, and violence: The young-male syndrome. *Ethology and Sociobiology, 6*, 59-73.
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, NJ: Lawrence Erlbaum.
- Zuckerman, M. (1984). Sensation seeking: A comparative approach to a human trait. *Behavioral and Brain Sciences, 7*, 413-471.
- Zuckerman, M. (1991). *Psychobiology of personality*. Cambridge, UK: Cambridge University Press.

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