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# Sex differences in the Big Five personality factors: Testing an evolutionary hypothesis

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## Abstract

Sex differences in the Big Five personality structure, as assessed by combined JPI and PRF scales, were examined in a student population ( $N = 528$ ) using factor analytic and covariance structure analysis techniques. An evolutionary hypothesis was tested, that the factor which lies between classical Agreeableness vs. Hostility and Neuroticism vs. Emotional Stability is the basic dimension of dominance-related aggressiveness maintained by frequency-dependent selection. The hypothesis predicts that this factor should explain more variance in males than in females. It was found that females were characterized by higher scores on the factor of Agreeableness and low Emotional Stability vs. Hostility and high Emotional Stability. As predicted, the factor of Agreeableness and low Emotional Stability explained significantly more variance in males than in females, both absolutely and in relation to other personality factors. The between-sex differences in personality factors are discussed in relation to studies of temperament, dominance and aggressiveness in non-human animals. © 1999 Elsevier Science Ltd. All rights reserved.

*Keywords:* Personality; Five-Factor model; Sex differences; Evolution; Frequency-dependent selection; Aggressiveness; Dominance

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## 1. Introduction

A consensus appeared during recent decades concerning the number and nature of the basic personality factors. The prevailing view postulates (see Digman, 1990; Goldberg, 1993) that human personality variation may be summarized by five major dimensions known as the Big Five: Extraversion (or Surgency), Neuroticism vs. Emotional Stability, Agreeableness, Conscientiousness and Intellect (or Openness to Experience). The extreme ubiquity and

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stability of the Big Five personality dimensions may suggest that they have an important adaptive significance (Buss, 1991): it is known that high levels of individual variability can be maintained by natural selection by means of density- or frequency-dependent mechanisms (Krebs and Davies, 1993; also see Wilson et al., 1994 for risk-taking). Many behavioral and cognitive processes traditionally studied by psychologists have evolved through natural selection to meet specific adaptive needs of our ancestors (Barkow et al., 1992). However, although the patterns of individual variability cannot be *a priori* considered an exception, at present it is not known what features of personality structure and to what extent, depend on the action of adaptive and non-adaptive (e.g. physiological or genetic constraints) mechanisms.

Sex differences in personality and temperament have been documented in many empirical studies (Buss and Plomin, 1984; Eysenck and Eysenck, 1985; Zuckerman, 1994; see also a recent meta-analysis by Feingold, 1994). There is no doubt that they have evolved in context of the major activities which influenced fitness of our ancestral species, such as social dominance, social exchange, mate choice etc. (Buss, 1991; Barkow et al., 1992). In most mammalian species, including *Homo sapiens*, males tend to be physically larger, more aggressive, dominance-oriented, risk-prone and exhibit lower investment in offspring than females; this is adaptive and reflects different reproductive strategies of the two sexes (Daly and Wilson, 1983; Eibl-Eibesfeldt, 1989).

As long as patterns of individual differences in aggressiveness are considered, there is a close correspondence between the dimensions of personality and aggression. Specifically, two basic dimensions of aggressive behavior were identified in humans, “Emotional Responsivity” and “Proneness to Aggression” and these dimensions are nearly isomorphic with Neuroticism and Agreeableness factors of the Big Five model (Caprara et al., 1994). Furthermore, a few studies (e.g. Caprara and Perugini, 1994; Ashton et al., 1998) have produced two factors at axes rotated at 45° from the traditional Agreeableness and Emotional Stability vectors. This rotation forms a factor of high Emotional Stability and Hostility (as well as a factor of high Emotional Stability and Agreeableness). Also, the study of Zuckerman et al. (1988) revealed two coherent clusters of traits in the high Psychoticism — high Neuroticism and high Psychoticism — low Neuroticism quadrants, which seem to be related to, respectively, psychopathic and dominance-related aggression. Thus, the broad factor which lies between Neuroticism and Agreeableness, may represent the basic dimension of dominance-oriented aggressive behavior in humans, which reflects adaptive individual differences and is presumably maintained by frequency-dependent selection. Indeed, in most animal species social dominance is associated not with just a high level of basic aggressiveness, but rather with a combination of aggressiveness and boldness (an analogue of Emotional Stability and Novelty Seeking), so that boldness often correlates with aggressiveness (Archer, 1988).

## 2. Hypothesis and prediction

Frequency-dependent selection occurs when the behavioral trait in question (e.g. dominance vs. submissive tendencies) has both benefits (priority to valued resources, e.g. mating) as well as costs (risk of physical injury, detrimental consequences of social stress, risk to “lose everything” etc.) and the higher proportion of individuals exhibit it (i.e. tend to become

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