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Short Communication

The General Factor of Personality: A reply to Muncer

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ABSTRACT

In previous studies we have shown that a General Factor of Personality (GFP) occupies the apex of the hierarchy of personality as well as the apex of the personality disorders in the same way that g, the general factor of mental ability, occupies the apex in the organization of cognitive abilities (Rushton & Irwing, 2011). In a critique, Muncer (2011) re-analyzed one of our data sets and concluded there was no evidence for a GFP. He also argued against the evolutionary theory we had proposed for the origin of the GFP. In this rejoinder I rebut Muncer's conclusion and describe how directional selection can explain the GFP.

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1. Introduction

We have shown that an integration of broad and narrow personality traits can be achieved by combining them hierarchically with a General Factor of Personality (GFP) occupying the apex in a similar way that g, the general factor of mental ability, occupies the apex in the organization of cognitive abilities (Musek, 2007; Rushton, Bons, & Hur, 2008; Rushton & Irwing, 2011). A GFP has been extracted from the inter-scale correlations of several sets of the Big Five, the California Psychological Inventory, the Comrey Personality Scales, the Dimensional Assessment of Personality Pathology, the EAS Temperament Scales, the Eysenck Personality Questionnaire, the Guilford–Zimmerman Temperament Survey, the HEXACO Personality Inventory, the Millon Clinical Multiaxial Inventory-III, the Minnesota Multiphasic Personality Inventory-2, the Multidimensional Personality Questionnaire, the Personality Assessment Inventory, the Personality Research Form, the Temperament and Character Inventory, and the Trait Emotional Intelligence Questionnaire (Erdle, Irwing, Rushton, & Park, 2010; Figueredo, Vásquez, Brumbach, & Schneider, 2004; Loehlin & Martin, 2011; Musek, 2007; Rushton & Irwing, 2008, 2009a,b,c,d; Rushton et al., 2008, 2009; Schermer & Vernon, 2010; Veselka, Schermer, Petrides, & Vernon, 2009b; Veselka et al., 2009a).

The GFP has been found across diverse samples and procedures. The largest sample consisted of 628,640 Internet respondents who completed the Big Five Inventory (Erdle et al., 2010). One study found the GFP was independent of method variance using a multi-trait–multimethod analysis of self-, teacher-, and parent-ratings of 391 13- to 14-year-olds on the Big Five Questionnaire—Children (Rushton et al., 2009). Several cross-national twin studies have found 50% of the variance on the GFP attributable to genetic influence and 50% to non-shared environmental influence. A South Korean twin study showed the GFP had emerged by 2- to 3-years of age (Rushton et al., 2008).

The explanation we favor for the GFP is that, like g, it arose through evolutionary selection for adaptive traits that facilitate performance across a wide range of contexts (Rushton et al., 2008). Consistent with the fast-slow life-history theory dubbed Differential K Theory by Rushton (1985), individuals high on the GFP are characterized as altruistic, agreeable, relaxed, conscientious, sociable, and intellectually open, with high levels of well-being, satisfaction with life, self-esteem, and emotional intelligence. Musek (2007), too, found that high scores on the GFP were related to self-esteem and positive affect and low scores to negative affect.

In his critique, Muncer (2011) ignored this large body of work (see Rushton & Irwing, 2011, for review). Instead he disaggregated a single study comprising 14 sets of 10 inter-scale correlations among the Big Five (Rushton & Irwing's, 2008 re-analysis of Digman, 1997). Muncer argued that because 8 of the 14 tables of Big Five correlations had at least one value that went in the wrong direction, as did 22 of the total 140 correlations, our analyses were invalid. Muncer tested Rushton & Irwing's (2008) model using each of the 14 correlation tables independently. Based on these (weaker) data and procedures, he failed to find good fits. Muncer (2011) saw no value in Rushton & Irwing's (2008) aggregation across the correlations and samples in the 14 studies ($N = 4496$), although that is a standard way in psychometrics of removing "error" and "specificity" variance in any one correlation, allowing "true score variance" to cumulate (Rushton, Brainerd, & Pressley, 1983).

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Muncer (2011) neglected to mention that we carried out several cross-validations of the model. For example, in the same paper we analyzed Digman's (1997) data, we cross-validated the observed model using four alternative Big-Five measures (N = 4000). In a further cross-validation, Rushton and Irwing (2009b) carried out a meta-analysis of 16 sets of inter-scale correlations compiled by De Young and colleagues (N = 6412). The largest cross validation came from 628,640 Internet respondents (Erdle et al., 2010). Together, these analyses approximate the ideal strategy outlined by Jöreskog (1993). Designated "strictly confirmatory," prior theory and research point to the correctness of a single model, which is then tested in a representative sample and, if confirmed, shows the model is generalizable.

To provide unequivocal evidence for the GFP, Rushton and Irwing (2008) examined a model specifying that the Big Two were uncorrelated. Since this provided a very poor fit, there was no plausible alternative to a model without a GFP. Muncer (2011) is incorrect to argue there is no statistical support for the GFP. He should have examined more of the literature, not taken a single data set from just one study (although it too showed the GFP).

A subsequent meta-analysis of 212 published sets of Big Five inter-scale correlations (N = 144,117) independently of ourselves corroborated the model (Van der Linden, te Nijenhuis, & Bakker, 2010a). These authors provided both a total analysis and replication analyses based on several criteria including questionnaires used (N = 19,106; 34,924; 51,987; 5619; 29,583), and whether other ratings were used, such as from peers, parents, and teachers (N = 2898). All procedures and samples (including those using other-reports) yielded a GFP. The size of the study allowed for very strong conclusions. Would Muncer (2011) really have recommended that Van der Linden, Scholte, Cillessen, te Nijenhuis, and Segers (2010b) carry out 212 separate analyses instead of aggregating the data in the way they did?

2. Directional selection of the GFP

The explanation we favor for the evolution of both g and the GFP is that they arose in part through social and sexual selection for socially desirable traits that facilitate performance across a wide range of contexts (Rushton & Irwing, 2011; Rushton et al., 2008). We followed Charles Darwin's (1809–1882) hypothesis that more cooperative and less contentious people leave more progeny. Individuals able to cooperate in groups also won competitions and wars.

Darwin was at first extremely reticent about extending his evolutionary theory to humankind. In the fourth last paragraph of *On the Origin of Species* (1859), he wrote only this: "Light will be thrown on the origin of man and his history" (p. 458). Within 13 years, however, it had become crucial for Darwin to generalize his theory to people in order to save it from alternatives that had arisen. For example, fellow evolutionist Alfred Russel Wallace (1823–1913) argued that evolution had stopped for people because their large brains freed them from the lower instincts. Philosopher John Stuart Mill (1806–1873) proposed that human morality should be based on making informed choices about the greatest good for the greatest number. Darwin took exception to these alternatives because they emphasized rationality to the exclusion of instinct and applied only to people.

Darwin (1871, 1872) maintained that evolution worked through natural selection by small gradations that required continuity between humans and other animals, even for moral and intellectual qualities. He wrote, "the difference in mind between man and the higher animals, great as it is, is certainly one of degree, and not of kind" (1871, p. 105). In regard to personality, Darwin viewed people as being more cooperative and less contentious

than "primeval man and his ape-like progenitors" (1871, p. 159). He described the advent of recent human qualities such as "courage, sympathy, and faithfulness," and the "need for approval by others," as well as the concomitant decrease in the number of "selfish and contentious people." The latter, he wrote, "will not cohere, and without coherence nothing can be effected" (1871, p. 159).

Darwin's cousin, Sir Francis Galton (1822–1911) was so inspired by the theory of evolution that he dedicated the remainder of his life to applying it to human differences. It was Galton (1887) who was the first to describe a General Factor of Personality, just as he had earlier (Galton, 1869) been the first to identify a general factor of cognitive ability. In his paper "Good and bad temper in English families," Galton used ratings from 1981 family members across four generations to group 15 desirable adjectives and 46 undesirable ones along a single dimension. He described "temper" as a strongly marked characteristic of all animals and suggested its human meaning be inferred from the adjectives used by his respondents, adjectives which, he thought, expressed one or other of its qualities or degrees.

Galton (1887) identified three times as many adjectives denoting bad temper by comparison with good temper and noted their arrangement in a bell-shaped distribution, with neutral scores in the middle, in the ratio of 2:1 to both extremes. He reported that females averaged a milder personality than males and that temperament ran in families. When both parents were good-tempered, 30% of the children were good-tempered and 10% bad-tempered, the remaining 60% being neutral. When both parents were bad-tempered, 52% of the children were bad-tempered and 4% good-tempered, the remainder being neutral. From these and other results Galton postulated that desirable traits went together because of mate preferences and assortative mating.

Muncer (2011) argued that Rushton got his evolutionary genetics wrong. He wrote, "evolutionary theory does not support the existence of the GFP, nor indeed does it provide a rationale for the many studies which are searching for it." Although Muncer argues (correctly) that directional selection requires an environment sufficiently constant over evolutionary time to support increasing levels of the GFP, he denies that such a scenario exists for personality. He does, however, go along with Penke, Denissen, and Miller's (2007) view that directional selection worked for g because the ability to solve novel problems constitutes an advantage in almost any environment and in consequence selection works in one direction. For personality, however, Muncer preferred "balancing selection" as the evolutionary mechanism in which a trait may confer reproductive advantage in some situations, but disadvantages in other situations. He gives the example of Extraversion promoting higher mating effort but interfering with stable pair bonding.

No doubt there are many selective forces operating, including stabilizing selection in which an optimal amount of a trait is selected in most situations. But these are empirical questions and Muncer (2011) provided no data, Muncer (2011) may not realize that Penke, Denissen, and Miller (2007) were in favor of g being directionally selected because of the empirical evidence from inbreeding depression and twin studies. These indicate the presence of genetic dominance (D; dominance and epistasis), a requirement for directional selection.

Rushton and Irwing (2011) reviewed evidence of directional selection for the GFP, including that people prefer others as partners, leaders, and friends who are *typically* prosocial, that is, high on GFP traits such as openness, conscientiousness, sociable, agreeable, and emotionally stable, thereby providing a recurring social environment for selection. They also reviewed the behavior genetic evidence. For example, D variance is inferred when the correlations for MZ twins are more than twice those for DZ twins. In a study of 575 pairs of 2- to 9-year-old South Korean twins, 53% of the

variance was found to be of the non-additive (*D*) variety (Rushton et al., 2008). Another study in Rushton et al. (2008) extracted the GFP from 29 self-ratings in 322 pairs of British twins and found the correlation for MZ pairs (.55) was more than twice that for DZ pairs (.14). Model-fitting gave the DE model the best fit, with *D* = 55% and *E* = 45%. A study by Rushton et al. (2009) extracted the GFP from 13 scales comprising the Big Five, four factors of emotional intelligence, and four factors of humor style in 316 Canadian and US twin pairs. The correlation for MZ twins (.41) was more than twice that for DZ twins (.05). Model-fitting gave the DE model the best fit, with *D* = 42% and *E* = 58%.

Genetic dominance is also suggested by evidence of inbreeding depression on components of the GFP. Inbreeding depression occurs on a trait when deleterious recessive alleles combine to lower the scores of offspring relative to parents. An Italian study found that inbred families were lower on Extraversion and Openness. A Dutch study found that the offspring of parents who came from the same region in the Netherlands (and so were more likely to be inbred) scored lower on sensation seeking than those whose parents came from different regions (see Rushton & Irwing, 2011, for references and further review).

A GFP has been extracted from over 24 different personality inventories, including several sets of the Big Five, the California Psychological Inventory (CPI), the Comrey Personality Scales (CPS), the Dimensional Assessment of Personality Pathology–Basic Questionnaire (DAPP–BQ), the EAS Temperament Scales (EAS), the Guilford–Zimmerman Temperament Survey (GZTS), the HEXACO Personality Inventory (HEXACO), the Hogan Personality Inventory (HPI), the Jackson Personality Inventory (JPI), the Millon Clinical Multiaxial Inventory-III (MCMI-III), the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), the Multidimensional Personality Questionnaire (MPQ), the Personality Assessment Inventory (PAI), the Personality Research Form (PRF), the Temperament and Character Inventory (TCI), and the Trait Emotional Intelligence Questionnaire (TEIQue).

The robustness of the GFP is attested to by the diversity of the inventories from which it has been extracted. A GFP emerged regardless of whether the inventory covered the domain of normal personality (the NEO–PI, FFI) or the domain of the personality disorders (the DAPP–BQ, MMPI-2, PAI, MMCI-III). A GFP emerged regardless of whether the inventory was based on theoretical criteria (the PRF, PAI) or aimed to be eclectic (the CPI, JPI). It emerged whether the inventory distinguished between scales of "temperament" and "personality" (the TCI), or between those of "personality disorders," "social conditions," and "attitudes toward therapy" (the PAI). A GFP also emerged regardless of whether the inventory used an empirical approach to scale construction and selected items based on the frequency of endorsement by criterion groups (the CPI, MMPI), an inductive approach and selected items based on their relation to each other (the PAI), or a rational approach based on writing items to fit traits defined in advance (the DAPP–BQ). A GFP similarly emerged when the inventory was constructed to minimize the effects of social desirability by selecting neutral items (the JPI, PRF).

There is nothing vague about the GFP. Quite the contrary; it is by definition the most internally consistent linear combination of all traits. Its location at the apex of the hierarchy should be almost completely fixed in any large data set. Nonetheless, we should make it clear that we are not at all implying that only one dimension will explain all manifestations of the rich and complex tapestry of the human personality. Nor does a general factor invalidate the utility or theoretical importance of lower order factors. It is an empirical question as to which level provides the best predictor for a given criterion. The personality facets that exist below the Big Five, and so are closer to the behavior expressed, are sometimes better predictors than higher-order traits. If a person

is experiencing anxiety over public speaking, it may be more beneficial to focus on his or her specific problem than on his or her general adjustment. But focusing on one specific lower-order trait should not obscure the existence of the hierarchical structure any more than it should obscure other relevant traits at the same level.

In conclusion, the theory and evidence presented here agrees with and extends the viewpoint of Darwin (1871), Wilson (1975), and others, that social competition and reproductive dynamics have helped direct human evolution. In particular, the evidence confirms a theoretical suggestion made by Rushton (1985, 1990) to the effect that much of the field of individual differences can be organized under a hierarchy of broad, heritable dimensions that, taken together, comprise a fast–slow (*r–K*) life history. This perspective provides increased coherence to the study of human behavior and makes unique predictions, not easily derivable from other approaches.

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