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Behavioral genetics of the higher-order factors of the Big Five

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Abstract

There is empirical evidence that underlying the Big Five personality factors are two higher-order factors which have come to be known as "alpha" (α) and "beta" (β). The α factor is defined by the agreeableness, conscientiousness, and emotional stability domains; whereas β is delineated by extraversion and intellect. It has been argued that α and β are important constructs because they bridge the gap between psychometric studies of personality and theories of personality development. However, it is unclear if α and β are constructs that can be reliably reproduced across a diverse range of independent samples. In a sample of 1209 MZ and 701 DZ twin pairs from Canada, Germany, and Japan who completed the NEO-PI-R, factorial analyses of the five NEO-PI-R domains extracted two factors resembling α and β. Subsequent multivariate genetic analyses revealed that this factor structure was a clear reflection of the organizing effects of multiple genetic influences, providing evidence for α and β as stable heuristic devices that can be used to integrate personality measurement and developmental theory.
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1. Introduction

There is growing evidence that the Big Five personality factors agreeableness (A), conscientiousness (C), emotional stability (ES), extraversion (Ex), and intellect (I) – considered to represent the basic descriptive units of personality – can be further reduced to two super-ordinate factors. For example, Digman (1997) consistently extracted two higher-order factors he called "alpha" (α) and "beta" (β) from several sets of published intercorrelations between these factors. Alpha was typically defined by factor loadings from A, C and ES whereas beta was delineated by loadings from Ex and I.

Digman (1997) argued that these higher-order traits are important for personality research because they provide a tangible link between psychometric models of personality used for the development of reliable taxonomies and measures for theories of personality development and human nature in general. For example, he wrote that complex ideas such as Freud's theories on psychosocial development or Adler's "social interest" which encompasses several concepts including aggression, hostility, impulse restraint and neurotic defence could only be captured by a broad construct like α, unlike A, C or ES could alone. Similarly, the fusion of Ex and I as β is a far more comprehensive reflection of constructs such as Roger's "personal growth", Adler's "superiority striving", or Maslow's "self-actualization" than is possible by either Ex or I individually.

Despite the apparent increase in conceptual clarity afforded by α and β, their actual relationship to developmental concepts has not been evaluated empirically. Such work cannot be conducted until the stability of these higher-order traits is better established. Although Digman's (1997) analyses typically extracted two higher-order factors, their composition was often defined by different Big Five factors in different samples. For example, in his analysis of Graziano and Ward's (1992) and John et al.'s (1984) data, α was defined only by A and C. In John, Goldberg, and Angleitner's (1984) data, β is defined solely by Ex. However, in Digman's (1963, 1994) own data, β was defined by Ex, I, and to some extent by ES (factor loadings just above threshold values of .40). Moreover, despite the differences in the composition of α and β, other reports have suggested the presence of a third higher-order factor. From an examination of several cross-national datasets, De Raad and Peabody (2005) reported evidence for higher-order factors that simply resembled broader versions of extraversion, agreeableness, and conscientiousness. Most surprisingly, neuroticism (a variant of emotional stability) was completely missing from their factor solutions which represents a fundamental departure from Digman's (1997) findings.

One possible reason for these differences is that the above reports assessed the Big Five using different scales and measures. Any variation in the item content of the measures could have an appreciable effect on the patterns of covariance between them. This source of error could be addressed by the use of a common instrument. Another explanation is that factorial variance is an unavoidable consequence of lexical models of personality. This could be addressed by examining the factor structure of a common measure across linguistically distinctive cultures to assess the effect of language differences and comprehension of concepts underlying a common measure.

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