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Personality level on the big five and the structure of intelligence

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Abstract

Research about changes in the structure of intelligence has generally not focused on the possible role played by personality traits. However, previous findings suggest that some personality traits (especially Neuroticism) could affect the structure of intelligence. Recently, there is a renewed interest in developing links between personality and intelligence. This interest calls for a theoretical integration of ability and non-ability traits. From this standpoint, the relationships between ability and non-ability traits at the structural level should be investigated. The NEO-FFI and three cognitive tests (PMA-V, PMA-E, and PMA-R) were administered to 569 university students. Samples were divided into three groups according to personality scores. This division was conducted separately for every personality trait. Further, the *g* factor was extracted in every group. Results show no change in the importance of the *g* factor across personality level groups. This pattern is replicated for the Big-Five. Therefore, it is concluded that personality traits play no role in the changes in the structure of intelligence. Possible explanations for this lack of differences between personality level groups, and future directions are discussed.

Keywords: Differentiation hypothesis; Structure of intelligence; Personality; Big-Five; PMA cognitive battery

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1. Introduction

The changes in the structure of cognitive abilities have become a central topic in the current research on human intelligence (Deary et al., 1996; Juan-Espinosa, 1997). Such structural changes have usually been investigated under the following hypotheses: ability-level differentiation, age-differentiation, and age-dedifferentiation. The first hypothesis is related to the role of ability-level, and states that the higher the level of *g*, the less the amount of variance accounted for by *g* (Abad, Colom, Juan-Espinosa, & García, 2004; Detterman & Daniel, 1989). The second and the third hypotheses are related to the role of age variables. The age-differentiation hypothesis states that from childhood ages to early maturity, the structure of intelligence changes from a unified, general ability to a set of abilities (Garrett, 1946; Juan-Espinosa, García, Colom, & Abad, 2000). However, from early maturity to late adulthood, the reverse phenomenon (designated as the age-dedifferentiation hypothesis) is postulated. So, an increase of the variance accounted for by *g*, as well as a reduction in the number of specific abilities would be expected (Balinsky, 1941; Juan-Espinosa et al., 2002).

These hypotheses have dominated the research on variations in the structure of intelligence. However, other variables have been hypothesized to affect the structure of intelligence. In this sense, personality traits have deserved some attention. Thus, in the sixties, it was found that extraverted, neurotic and subjects with a clinical disorder had a less differentiated cognitive structure than introverted, emotionally stable and subjects without a clinical disorder, respectively (Balzert, 1968; Lienert, 1963). Also, Lienert (1966) found that the structure of cognitive abilities was less differentiated in the group of students who answered psychological tests under the effects of LSD. However, other authors were not able to replicate those results (Cohen & Witteman, 1967).

Further, Austin, Deary, and Gibson (1997) divided a sample of Scottish farmers ($N = 210$) by using the mean in the corresponding personality scale as the cut-off point. They hypothesised that cognitive abilities had a different structure at low and high levels of neuroticism, with less ability differentiation in high-*N* groups. This hypothesis received tentative support from the demonstration of an increase in the correlation between a verbal test named National Adult Reading Test (NART), and the Raven test with increasing *N*. In agreement with Austin et al. (1997), Austin, Hofer, Deary, and Eber (2000) found that the correlation between two ability measures (The intelligence sub-scale of the 16-PF and the Cattell's Culture Fair Intelligence Test) varies with level of neuroticism, the correlations for the high-*N* groups being larger. This finding was consistent across two extremely large sub-samples (more than 15,000 subjects each one). However, conclusions derived from both studies were based on simple correlations between two cognitive tests and, as Austin et al. (1997) emphasised, further work using a wider range of ability tests, allowing more detailed factor-analytic studies, would be necessary.

Austin et al. (1997) also investigated the impact of the Openness factor on the correlations between the NART and the Raven. This last analysis is sustained by the relationships between Openness and cognitive abilities as knowledge achievement or creative thinking (McCrae, 1987). From this view, individual differences on Openness would be related to intelligence. In fact, correlations found between Openness and intelligence measures are usually around 0.30 (Costa & McCrae, 1992). The meta-analytic study by Ackerman and Heggestad (1997) concluded that the