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INTELLIGENCE, ACADEMIC ABILITIES, AND PERSONALITY

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Summary—It has been proposed that personality (in the narrow sense) and intelligence are uncorrelated and essentially independent constructs (Eysenck, H. J., 1994, Personality and intelligence: psychometric and experimental approaches. In R. J. Sternberg and P. Ruzgis (Eds.), *Personality and intelligence* (pp. 3–31), New York: Cambridge University Press). The results of this study show that personality dimensions measured by the NEO Personality Inventory stay clearly apart from academic abilities and psychometrically measured intelligence. Correlation and joint factor analyses demonstrated that most of the valid variance in academic achievement and intelligence was not related to personality measures in the Estonian population forming a separate dimension of individual differences. The lack of correlation between academic abilities and personality, however, does not exclude that individuals with low or high intellectual abilities might use their intellectual resources differently for the expression of their individuality. It was found that low-intelligence persons use their intellectual abilities primarily for seeking excitement and elaborating fantasies; high-intelligence persons, in contrast, use their intellect for regulating and controlling their affective lives. © 1997 Elsevier Science Ltd

Keywords: intelligence; academic ability; personality; NEO Personality Inventory.

INTRODUCTION

Psychologists have repeatedly suggested the importance of intelligence for the expression and development of individuality (see Ackerman, 1996; Baron, 1982). Cattell (1957, p. 871), for example, implied that general ability is so potent and ubiquitous that it is an invariable accompaniment to other personality dimensions, even when one is not seeking it. Cattell believed that many pure 'personality' factors have some substantial intellectual ability component and that the general ability factor influences some of these genuine personality manifestations such as scope of interests or conscientiousness (Cattell, 1957, p. 873).

However, empirical studies have typically found only modest correlations between measures of intelligence and personality (see Eysenck, 1994; Zeidner, 1995). On the basis of these observations, it was proposed that personality (in the narrow sense) and intelligence are uncorrelated and essentially independent constructs (Brand, 1996; Eysenck, 1994). This proposal was also supported by the studies in the Five Factor Model tradition: personality dimensions measured by the NEO Personality Inventory (NEO-PI) appeared to stay clearly separate from measures of intelligence (McCrae, 1993–1994; McCrae & Costa, 1985a, 1997).

A lack of direct correlation between intelligence and personality does not exclude a more refined interaction between these two areas. It is possible that intelligence represents a mean through which a person develops and expresses his/her personality (see Block & Kremen, 1996). In this study, we were investigating how individuals with low and high intellectual abilities use their intellectual resources differently to express their individuality.

METHOD

Participants

The sample for this study consisted of 1164 Estonians and Estonian-speaking Russians (339 males and 825 females) who were applying for admission to the Faculty of Social Sciences at the University

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of Tartu. The applicants' age ranged from 17 to 39 with the mean age of 19.1 yr (S.D. = 2.3). All applicants had to: (a) take an entrance exam consisting of an intelligence test and a subject test; (b) take a foreign language test; and (c) write an essay.

Measures

Intelligence test. The first part of the entrance exam, the intelligence test (IT) contained 70 questions (mean = 41.9, S.D. = 8.8) designed to measure the applicants' verbal, analytical, and quantitative abilities. Valid data were obtained from 998 applicants. The Cronbach alpha for the test was 0.85.

Subject test. The second part of the entrance exam was a subject test (ST) that consisted of 50 questions and was intended to measure both the knowledge of the world and Estonian history and of civics and social theory.

Essay. The applicants were required to write an essay to demonstrate their writing skills in Estonian. This included the ability to generate and organize ideas, to support those ideas with examples or evidence and to compose in standard written Estonian in response to the given topics. The number of applicants who wrote an essay was 968.

Foreign language test. 857 applicants took a test on English, German, or French. The test was designed to measure applicants' abilities to recognize language which is appropriate for standard written English/German/French and to comprehend standard written English/German/French.

Academic background. According to the application procedure, the applicants had to provide a copy of their academic record from the institution of secondary education that they had attended. The secondary school grades were provided in the following subjects: Estonian language, Estonian literature, Russian language, foreign language (English/German/French), mathematics, physics, chemistry, biology, geography, history, Estonian history, and physical education. On the basis of these 12 grades, a secondary school mean grade (MG) was computed for each applicant.

NEO-PI. Of the 1164 applicants, 405 volunteers (292 females and 113 males, mean age = 19.7, S.D. = 2.4) completed the Estonian version of the NEO-PI (Pulver, Allik, Pulkkinen & Hämäläinen, 1995). The Estonian NEO-PI is a 181-item questionnaire developed to measure the five major domains of personality: Neuroticism (N), Extraversion (E), Openness to Experience (O), Conscientiousness (C), and Agreeableness (A). Items are answered on a five-point scale ranging from 'strongly agree' to 'strongly disagree'.

RESULTS

Table 1 shows correlations between the NEO-PI personality domains and different indicators of academic abilities. The correlations found between the NEO-PI domains and various indicators of academic abilities were relatively small. A surprising finding was that the IT was not correlated with O ($r = 0.01$, $P = $ n. s.) but with two other personality domains, C ($r = -0.19$, $P = 0.000$) and A ($r = -0.18$, $P = 0.000$).

These relatively weak correlations suggest that most of the valid variance of intelligence and academic abilities is not related to personality measures. Further support for this observation was obtained when measures of personality and academic abilities were subjected to a joint factor

Table 1. Correlations between the NEO-PI domain scales and different indicators of academic abilities

| | NEO-PI domains | | | | |
	N	E	O	C	A
Mean grades (MG)	0.11*	−0.00	0.07	0.12*	−0.05
Intelligence test (IT)	0.06	−0.08	0.01	−0.19**	−0.18**
Subject test (ST)	0.08	−0.07	−0.00	−0.15**	−0.28**
Essay	0.11*	−0.07	0.12*	−0.10	−0.11*
Foreign language test	0.15*	−0.06	0.01	−0.16**	−0.08

$N = 381$.
N, Neuroticism; E, Extraversion; O, Openness to experience; C, Conscientiousness; A, Agreeableness.
*$p < 0.05$; **$p < 0.01$.

Table 2. Joint principal component analysis of measures of academic ability and personality

	Factor 1	Factor 2	Factor 3	Factor loadings Factor 4	Factor 5	Factor 6	r^2
Mean grades (MG)	−28	03	05	**61**	**34**	03	28
Intelligence test (IT)	14	−11	−20	**67**	−15	09	37
Subject test (ST)	05	−07	−28	**68**	−06	04	39
Essay	−07	−04	−03	**63**	−01	08	23
Foreign language test	−07	02	09	**70**	−15	−08	30
N1—Anxiety	**−81**	−24	−07	04	−17	02	67
N2—Hostility	**−72**	08	**−39**	00	−08	06	54
N3—Depression	**−65**	**−49**	01	08	−23	09	71
N4—Self-consciousness	**−65**	**−48**	01	08	−12	−15	63
N5—Impulsiveness	**−51**	19	−25	05	**−54**	06	55
N6—Vulnerability	**−69**	−24	02	04	**−38**	−17	63
E1—Warmth	15	**72**	**31**	−09	11	17	62
E2—Gregariousness	05	**78**	09	02	−03	−12	49
E3—Assertiveness	24	**59**	**−34**	00	28	17	58
E4—Activity	04	**77**	−11	00	**30**	10	64
E5—Excitement-seeking	08	**62**	−19	−06	−08	28	47
E6—Positive emotions	09	**78**	13	−07	04	−00	58
O1—Fantasy	**−34**	06	16	05	−28	**51**	41
O2—Aesthetics	−11	03	12	−04	11	**75**	43
O3—Feelings	**−37**	29	**36**	−11	13	**49**	45
O4—Actions	13	**40**	−02	04	−17	**53**	42
O5—Ideas	15	−08	−04	05	06	**83**	47
O6—Values	12	16	11	23	−20	**50**	27
C1—Conscientiousness (1)	15	14	22	−10	**78**	−05	62
C2—Conscientiousness (2)	19	13	13	−02	**82**	−05	62
C3—Conscientiousness (3)	24	13	04	−11	**81**	−04	64
A1—Agreeableness (1)	02	−06	**77**	−05	07	15	45
A2—Agreeableness (2)	19	−06	**71**	−14	08	08	40
A3—Agreeableness (3)	07	18	**68**	−08	23	04	40
Explained variance	12%	14%	8%	8%	11%	9%	

$N = 380$. Decimal points have been omitted to enhance readability. Loadings above (0.30) are shown in boldface. In order to overcome the discrepancy between the number of items in Neuroticism (N1–N6), Extraversion (E1–E6), Openness (O1–O6) facet scales (eight items in each), on the one hand, and 18 items each in the Conscientiousness (C) and the Agreeableness (A) scales, on the other hand, the latter two were divided into three random sets consisting of six items in each (see Borkenau & Ostendorf, 1990; Pulver et al., 1995).

analysis. Table 2 shows the results of the principal component analysis followed by a varimax normalized rotation. The plot of eigenvalues for the first 20 factors is shown in Fig. 1. Three different criteria, Kaiser eigenvalue-larger-than-one rule, Cattell's scree-test, and Horn's parallel analysis (see Zwick & Velicer, 1986) indicated that six factors should be retained. Five of these factors were easily identified as the NEO-PI dimensions and a distinct, sixth factor was formed by the measures of the academic abilities. All personality measures, except Openness to Values (O6) with a loading of 0.23, had virtually near-zero loadings on the sixth factor. Further, multiple regression analysis indicated that on the basis of the performance in analytic and academic tasks it is almost impossible to say something about an individual's personality. Of five different indicators of academic abilities (IT, ST, essay, foreign language test, and MG) it was possible to predict only 2.0%, 1.9%, 1.4%, 9.8%, and 10.1% variance of N, E, O, C, and A, respectively.

Lack of strong correlations between the measures of academic abilities and personality does not exclude more refined forms of interdependence between these two broad areas of individual differences. In order to look for more subtle interrelations, the sample was divided into three subsamples with low (IT ≤ 36, $n = 105$), mean (35 < IT > 46, $n = 171$), and high (IT ≥ 46, $n = 109$) IT scores. One-way ANOVA was used to test the difference in the NEO-PI domain and facet scores between these three groups. The results showed that the means were significantly different for two domains and three facets of the NEO-PI. Table 3 shows that the group with a low IT score had significantly higher scores on C and A than the group with a high IT score. The means of the two facets of E (Warmth and Positive Emotions) and of facet of O (Openness to Feelings), were also different for these two groups: individuals with a high IT score scored significantly lower on these three facet scales.

The two extreme groups of low and high intelligence revealed a slight difference in the relationship between personality and intellectual abilities. In the group with the low IT score only two NEO-PI facet scales were significantly correlated with the performance in the IT: Excitement-Seeking ($r = 0.25$, $P = 0.011$) and Openness to Fantasy ($r = 0.24$, $P = 0.016$). Thus, in this group, persons who
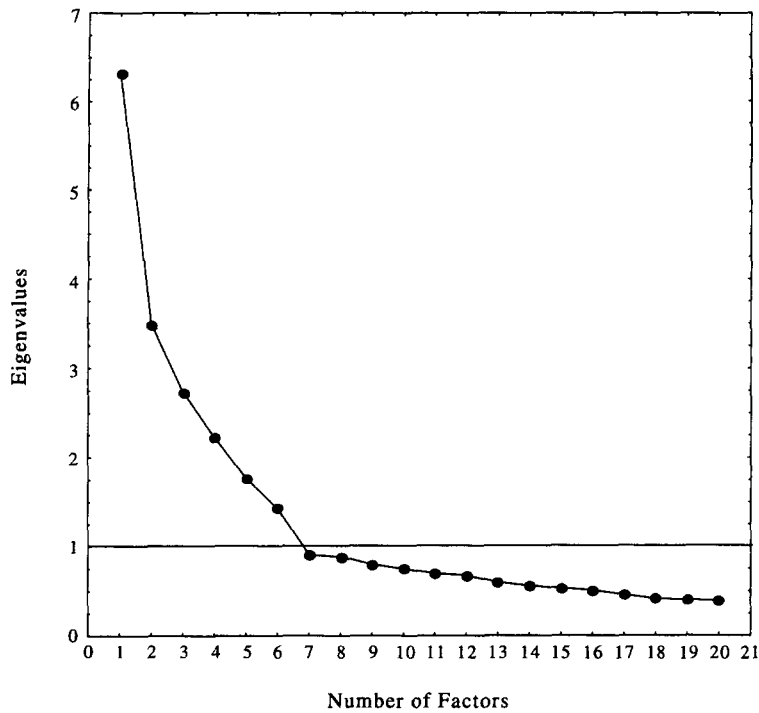
Number of Factors

Fig. 1. The scree plot for the joint factor analysis of the NEO-PI facet scales and different indicators of academic abilities.

Table 3. One-way ANOVA of significantly different means for low, medium, and high intelligence groups

Intelligence	NEO-PI domains and facets				
	C	A	E1	E6	O3
Low	56.6	50.8	25.4	23.9	25.6
Medium	53.5	49.1	24.8	24.2	25.0
High	52.2	47.5	23.3	22.1	23.8
All sample	53.9	49.1	24.5	23.5	24.8
F	5.4	4.6	6.0	4.9	4.3
P	0.005	0.010	0.003	0.008	0.014

Smallest N for any variable is 389.

C, conscientiousness; A, Agreeableness; E1, Warmth; E6, Positive Emotions; O3, Feelings.

Post-hoc comparison of means (Sheffé, Newman-Keuls and Tukey honest significant difference tests) showed that all differences between low and high intelligence groups were significant and for the Warmth (E1) scale also the difference between high and medium groups was significant at least at the level of significance $P < 0.05$.

crave excitement and have more intense feelings also solve the intelligence tasks better. In turn, the group with the high IT score demonstrated a rather different pattern of correlations between intelligence and personality. In this group, both C ($r = -0.22$, $P = 0.019$) and A ($r = -0.25$, $P = 0.007$) were negatively correlated with the IT score. Intelligence was also negatively correlated with three facet scales: Warmth ($r = -0.21$, $P = 0.024$); Positive Emotions ($r = -0.21$, $P = 0.026$); and Openness to Feelings ($r = -0.20$, $P = 0.031$). Thus, in this group, persons who are less affectionate, less exuberant, and more blunted in their affects have somewhat better chances of doing well in the intelligence tasks.

DISCUSSION

The results of this study confirm observations that personality measured by the NEO-PI is poorly correlated with psychometrically measured intelligence and indicators of academic abilities. A joint factor analysis of the NEO-PI scales and indicators of academic abilities showed that there were no

factors on which both personality and academic ability items were loaded. Also, the multiple regression analysis demonstrated that most of the valid variance in academic performance and intelligence was not related to any aspect of personality. Thus, the Big Five personality domains and academic abilities stayed clearly apart from each other (see McCrae & Costa, 1985b, 1997). In accordance with other studies (Dollinger & Orf, 1991; Rothstein, Paunonen, Rush & King, 1994), academic grades were found to be unrelated to the NEO-PI factors.

One surprising result was lack of correlation between O and academic abilities. Typically, in English speaking samples, the correlation between O measured by the NEO-PI and different psychometric measures of intelligence (WAIS, Army Alpha etc.) is within the range of 0.20–0.33 (see McCrae, 1993–1994; McCrae & Costa, 1985a; Rolfhus & Ackerman, 1996). In our sample, however, this correlation was practically zero. It is strange that individuals who are, by definition, curious about both the inner and the outer world, willing to entertain novel ideas, have no better chances for success in academic situations. On the basis of existing information, it is difficult to say how relevant is the discrepancy between English and Estonian samples and how it could be explained.

In general, academic abilities and personality seem to be two separate domains (Eysenck, 1994). However, the lack of correlation does not exclude more refined forms of interaction between these two realms. When the whole sample was divided into three groups, so that approximately equal subsamples with low and high intelligence were selected out, it was possible to notice a different pattern of relations between mental abilities and personality in these two groups. Firstly, high scorers on the IT were more likely to be those who were low on A (sceptical, egocentric, antagonistic) and on C (hedonistic, weak-willed). As far as the negative correlation between the IT and A is concerned, a similar result was obtained by Honzik & MacFarlane (1973), who found that IQ is negatively correlated with the tendency to arouse liking and acceptance in people and gregarious tendencies of being with others. The inverted relationship between the IT and C is, however, an unexpected finding because the high score on C is typically associated with academic and occupational achievement (see Costa & McCrae, 1992). One possible explanation of this inverted relationship is the elevated level of C in this sample as compared to the norm group (see Pulver *et al.*, 1995). The NEO-PI data were collected in a very demanding life-situation, and it is possible that those who were not very certain about their cognitive abilities tried to compensate for it by stressing their purposefulness, self-control, and will to achieve.

It is remarkable that intelligence was correlated with three NEO-PI facets, which are all related to affects, only in the high intelligence group. All these three facets, warmth, positive emotions, and openness to feelings, have demonstrated the strongest correlations with affective vocabulary both in English and Estonian samples (Allik & Realo, in press; Watson & Clark, 1992). Thus, in this group, emotions and cognitive abilities were negatively linked. There was no such opposition in the low intelligence group, where, in turn, intelligence was associated with excitement-seeking and fantasy. These results seem to suggest that intelligence represents different means through which an individual can express his or her individuality in these two extreme groups. Those individuals who do not have very high intellectual abilities use their intellectual resources for seeking excitement and elaborating their fantasies. The high-intelligence persons, in contrast, use their intellectual resources for controlling their affective lives with the aim to reduce excessive and exuberant feelings. This group is perhaps best characterized by the words of René Descartes:

> "But the principal use of prudence or self-control is that it teaches us to be masters of our passions, and to so control and guide them that the evils which they cause are quite bearable, and that we even derive joy from them all" (Descartes, 1955, p. 427).

Thus, we can conclude that despite the lack of robust correlations between intelligence and personality, individuals with different cognitive abilities use their intellectual resources for different purposes. We found that low-intelligence persons use their intellectual abilities primarily for seeking excitement and elaborating fantasies and high-intelligence persons use their intellect to regulate and control their affective lives.

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