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Review

Structure of personality: Search for a general factor viewed from a temperament perspective

Bogdan Zawadzki [a], Jan Strelau [b,*]

[a] Faculty of Psychology, University of Warsaw, Stawki 5/7, 00-183 Warsaw, Poland
[b] Warsaw School of Social Sciences and Humanities, Faculty of Psychology, Chodakowska 19/31, 03-815 Warsaw, Poland

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ABSTRACT

We examined the general factor of personality (GFP) in the structure of six Polish language inventories (32 scales) and found the GFP most saturated by temperament traits located within Neuroticism and Extraversion (with high congruence between samples and applied measures). Data were obtained in two samples comprising over 2000 individuals by self-report and peer-ratings from analyses of six following inventories: NEO-FFI, EPQ-R, EAS-TS, DOTS-R, PTS, and FCB-TI. We suggest that arousability is the pivotal biological mechanism for these traits (and the GFP) and above this, the GFP may primarily reflect only a classification of basic dimensions of personality, based on their shared variances, which it is not useful to reduce to one general factor.

1. Introduction

The idea of one general personality factor has several forerunners in the literature (e.g., Webb, 1915). It also has roots in the theory of evolution and sociobiology. For example, Rushton (1985) adopted the idea from MacArthur and Wilson (1967); also Pianka (1970) of an *r-K* continuum of fast-slow life-histories on which individuals and species differ. Individual differences in *K* among humans are said to be expressed in personality and social behavior. Rushton stated that a *K*-person is higher in intelligence, altruism, and law-abidingness, and lower in sex drive. Thus, an exciting, if open–ended, possibility is that one basic dimension – *K* – underlies much of the field of personality (Rushton, 1985, p. 445). Subsequently, Rushton and Irwing (2009a, 2009b) conducted a series of studies demonstrating that many hierarchically structured personality theories, and especially the Big Five personality structure, can be reduced to One Big dimension.

Others too have found higher-order factors in the Big Five. For example, Digman (1997) conducted a meta-analysis of 14 studies on children, adolescents, and adults, and distinguished two higher-order factors: *Alpha*, with loadings on Agreeableness (A), Conscientiousness (C), and Emotional stability (ES, the reverse of Neuroticism); and *Beta*, with loadings on Extraversion (E) and Openness (O), which he identified with socialization processes and personal growth, respectively. DeYoung, Peterson, and Higgins (2001) replicated the two higher-order factors and re-labeled them as *Stability* and *Plasticity*, respectively, which they associated with conformity and anti-conformity.

It was Musek (2007) who first arrived at the conclusion that above Alpha and Beta was the Big One. He obtained this result from three independent samples and six inventories all given in the Slovenian language. Musek found that when the GFP was extracted separately from the three measures of the Big Five (BFI, IPIP, and BFO), the loadings of all five dimensions varied from .41 (Agreeableness) to −.84 (Neuroticism), with Openness loading only .23. Musek's study also showed that all indices of Emotionality, well-being, and self-esteem were associated with the GFP.

Following Musek's (2007) paper, there has been an explosion of GFP studies. For example, Rushton and Irwing (2009a, 2009b) demonstrated the GFP occupies the apex of the structure of personality generated from several sets of personality inventories. Rushton and Irwing (2009a) extracted a GFP from 16 samples of the Big Five compiled from studies carried out by DeYoung and colleagues, as well as from the Guilford–Zimmerman Temperament Survey (GZTS), the California Psychological Inventory (CPI), and the Temperament and Character Inventory (TCI). Rushton and Irwing (2009b) extracted the GFP from the Multidimensional Personality Questionnaire (MPQ). They proposed a personality structure with the GFP at the apex with loadings of a Big Two or a Big Three at the second level (e.g., Rushton & Irwing, 2008). However, the GFP loadings differed from study to study. Typically, they were highest for Stability and Plasticity generated from the Big Five (.72 and .75 respectively), and lower for the GFP derived from the GZTS (.59 and −.59) and the MPQ (.50). For the CPI and TCI, the GFP was saturated by three factors (different for both inventories) with different loadings. In the Comrey scales, Self-Control (.18), Extraversion (.24) and

* Corresponding author. Tel.: +48 225179707; fax: +48 225179901.
E-mail address: jan.strelau@swps.edu.pl (J. Strelau).

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Emotional Health (.99) were the higher-order factors. In the case of the TCI, the three second-order factors were Alpha, Beta, and Gamma, with Gamma saturated by Self-Transcendence, Cooperativeness, and Reward Dependence (.99). In the newest paper Irwing and Rushton (submitted) extracted GFP from data obtained by the Jackson Personality Inventory, the Hogan Personality Inventory, the Mini-Markers, and the Big Five Inventory, through Plasticity (loadings varying from .49 to .97) and Stability second-order factors (loadings from .42 to .98).

In this paper, we go beyond Big Five Inventories to examine whether, in a broader array of inventories, mainly concerned with temperament, the central core of the GFP can be identified. We put forward one basic hypothesis, namely that the two super-factors of Extraversion and Neuroticism are the core (root) temperament factors of the GFP (Strelau, 2008; Strelau & Zawadzki, 1997).

Table 1
GFP derived from the NEO-FFI scales.

NEO-FFI scales	Sample A – self-report	Sample B – self-report	Sample B – peer-rating
ES (N−)	0.58	0.66	0.63
E	0.50	0.54	0.45
O	0.14	0.18	0.30
A	0.32	0.33	0.53
C	0.42	0.48	0.50
Eigenvalue	0.88 (17.7%)	1.09 (21.9%)	1.23 (24.6%)

Note: ES, Emotional Stability (reversed Neuroticism, N); E, Extraversion; O, Openness to Experience; A, Agreeableness; C, Conscientiousness. The GFP was derived as the first factor via Principal Axes. Tucker's coefficient for one-factor similarity: self-report (Samples A and B) = .999, Sample B (self-report and peer-rating) = .97 (Sample A self-report and Sample B peer-rating = .97).

2. Method

The data were collected from two different samples representing both genders and ranging in age from 16 to 77 years (total $N = 2000+$). The following inventories were administered, although the procedure varied by sample. (Alpha reliabilities are in parentheses.) The NEO Five-Factor Inventory (NEO-FFI) in Polish adaptation (Zawadzki, Strelau, Szczepaniak, & Śliwińska, 1988) with the following scales: Neuroticism (N, .80), Extraversion (E, .77), Openness (O, .68), Agreeableness (A, .68) and Conscientiousness (C, .82). The Formal Characteristics of Behavior–Temperament Inventory (FCB–TI) – Polish version (Zawadzki & Strelau, 1997) with the following scales: Briskness (.77), Perseveration (.79), Sensory Sensitivity (.73), Emotional Reactivity (.83), Endurance (.85), and Activity (.83). The Pavlovian Temperament Survey – Polish version (Strelau & Zawadzki, 1998; for English version see: Strelau, Angleitner, & Newberry, 1999), composed of three scales: Strength of Excitation (.80), Strength of Inhibition (.72), and Mobility of the Nervous Processes (.82). The Eysenck Personality Questionnaire – Revised (EPQ-R) in Polish adaptation (Brzozowski & Drwal, 1995), including Extraversion (.86), Neuroticism (.84), and Psychoticism (.70). The EAS Temperament Survey (EAS-TS) for adults in Polish adaptation (Oniszczenko, 1997), including Sociability (.57), Activity (.66), Fear (.70), Distress (.74) and Anger (.59). The Revised Dimensions of Temperament Survey (DOTS-R) adapted to Polish by Śliwińska, Zawadzki, and Strelau (1995), composed of the following 10 scales: Activity Level–General (.72), Activity–Sleep (.77), Approach–Withdrawal (.69), Flexibility–Rigidity (.56), Mood–Quality (.81), Rhythmicity–Sleep (.68), Rhythmicity–Eating (.74), Rhythmicity–Habits (.61), Distractibility (.47), and Persistence (.53).

In Sample A ($N = 919$, 443 females and 476 males) all six inventories were applied in a self-report version. In Sample B ($N = 1092$, 664 females and 428 males), the same inventories were administered in both self-report and peer-rating versions (by two independent peers). The peers (Total $N = 2184$; 1282 women and 716 men; [for 186 raters lack of information about gender], aged 14–87, $M = 36$ years) were recruited mostly from family members and friends. In all samples the scores were corrected for the age and gender of the target person via linear regression and saved as standardized residuals. In the case of peer-rating, the results were averaged for target subject across both peers.

3. Results

In order to test our hypothesis, the GFP was directly generated on the basis of the NEO-FFI scales in both samples taking into account self-report data as well as peer-ratings (see Table 1).

The results show diverse loadings of the Big Five scales on the GFP with the lowest scores on Openness for both self-report (.14 and .18) and peer-report (.30). For the remaining factors the loadings varied between .42 (*C* for self-report) and .66 (ES/-N for self-report). Confirmative factor analysis showed that a one-factor model with assumptions of equal loadings, as implicitly suggested in the GFP literature, demonstrated a worse fit (assessed by χ^2) in comparison with the one-factor model which assumed unequal loadings. This finding indicates that the separate NEO-FFI scales contributed quite differently to the GFP.

In a second step, with results obtained from both samples (self-report and peer-report), a factor analysis was conducted on the 32 personality/temperament scales with the aim of identifying the Big Five (OCEAN) factors (Table 2).

As shown in Table 2, the Openness factor had low loadings on all five factors (−.02 to .23) and is replaced by a Rhythmicity factor (Openness loaded .23). This is not surprising if one considers that the DOTS-R inventory has three rhythmicity scales stemming from Thomas and Chess' (1977) theory of temperament. Factor *N* has the highest loadings on Neuroticism (−.83, and −.70 – reversed to ES), Emotional Reactivity, and Perseveration (−.68 and −.64), and on three Emotionality scales (Distress, −.79, Anger, −.62, and Fear, −.61). Factor E has the highest loadings on the two Extraversion scales (.85 and .77), on Activity (.68, as measured by FCB-TI), and on Sociability (.62, EAS-TS). The configuration of scales loading on the factor Conscientiousness included the scales of Conscientiousness (.47), Briskness (.54), Endurance (.47), Distractibility (.44) and Persistence (.49). None of the scales loaded as high as .60. Factor *A* is among the 32 scales represented by only two scales – Agreeableness (−.62) and Psychoticism (.64). Similar results were obtained in Sample B. Tucker's coefficients were very consistent for factor similarity between self-report and peer-rating (Sample B): $N = .99$, $E = .99$, $C = .97$, $A = .95$, and $R/O = .97$. This was also true when Tucker's coefficient was calculated for factor similarity between Samples A and B (self-report): $N = .99$, $E = .99$, $C = .95$, $A = .90$, and $R/O = .97$; and for Sample A self-report and Sample B peer-rating: $N = .99$, $E = .98$, $C = .91$, $A = .90$, and $R/O = .93$.

After the five factors were separated, further analysis was conducted taking as a point of departure the obtained five-factor solution with the aim to generate the GFP, derived as the first factor via Principal Axes. As shown in Table 3, the five factors have very different loadings with Rhythmicity being close to zero (.04 to .10). Confirmatory factor analysis showed the assumption of equal loadings across factors on the GFP downgrades the fitness of the one-factor model.

Taking into account that the representation of scales in all five factors contributing to the GFP is not identical, the next step of factor analysis was undertaken. From each of the five factors obtained from the 32 personality/temperament scales, the four with the