Anomaly in equation for calculating 16PF second order factor QIII

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Abstract

Recently, the Institute for Personality and Ability Testing (IPAT) has released a new set of equations for calculating 16PF second-order factors. These revised equations were compared with the earlier ones provided in the 16PF Handbook, as well as with those used in the Clinical Analysis Questionnaire (CAQ) for computing the second-order trait dimensions. It was found that the earlier 16PF Handbook equation for calculating QIII (Tough Poise) was not accurate. It is recommended that only the new equations be employed in future work with the 16PF. Moreover, this finding may have implications for published studies involving the 16PF second-order factors over recent decades. A re-examination of many of these studies in light of the new second-order equations would seem warranted, as conclusions drawn may alter somewhat with the correct computation of QIII (at least for males).
Calculation of second-order personality-type factors from the Sixteen Personality Factor Questionnaire (16PF-Cattell, Eber and Tatsuoka, 1970) has been traditionally based on the sets of linear-additive regression equations provided in the Handbook for the 16PF (pp. 128-129). Prediction equations were provided for no fewer than eight second-order 16PF dimensions, on the grounds that Cattell et al. (1970) extracted this number of factors from inter-correlations of the 16 primary trait scores. However, perusal of the prediction weights for each second-order factor indicates that too many factors were extracted at the second-stratum level, as the dimension labelled Intelligence (QVII) is defined precisely by the primary Factor B (and is therefore a specific dimension, separate from the remaining ones, which pertain to personality rather than cognitive characteristics). As well, Krug (1988) has pointed out that, "Cattell extracted and rotated more factors than were warranted in the analysis that lead to the old equations and thereby distributed the variance that should have gone into a single Tough Poise into two separate factors. One he called Tough Poise (or Cortertia to use his term), the other he called Prodigal Subjectivity". Given that over-extraction of factors had occurred at the second-stratum level, it would be expected that the multiple regression equations which were provided in the 16PF Handbook might also be less than adequate. The present investigation sought to clarify this issue.

METHOD

Subjects

All Ss included in this study were individuals who had volunteered for employment in Antarctica, as members of the Australian Antarctic Research Expedition (ANARE). Virtually all 95 Ss were young, healthy males aged in the
early 20-30 year age range. These Ss were above average in intelligence, and represented a select sample of the general Australian population at large, with fewer than 4% of them exhibiting any psychological disturbances (neurotic-not psychotic) during lengthy periods of confinement in the Antarctic environment. The majority of Ss were Australian by birth. The sample included individuals from a diverse range of occupational and sociocultural backgrounds.

Procedure

All Ss were administered both Forms A and B of the 16PF (thereby ensuring adequate reliability of the primary trait scores), as well as Part II of the Clinical Analysis Questionnaire (CAQ-Krug, 1980) as part of the overall selection strategy employed by the Australian Army Psychology Corps. Part II of the CAQ includes questions intended to measure abnormal personality traits, as opposed to the normal 16PF ones (measured in Part 1). While both normal and psycho-pathological second-order factors can be calculated from the CAQ prediction equations (Krug and Laughlin, 1977), only those pertaining to the normal personality dimensions were examined (cf. Boyle, 1987a,b).

Krug and Johns (1986) refactored the 16PF at the second-order level on a massive sample of 17,381 individuals (including 9222 males and 8159 females). Their findings have demonstrated that there are five secondary personality-type dimensions measured in the 16PF. The five second-order 16PF factors (excluding intelligence which loaded solely on primary Factor B) obtained were QI (Extraversion), QII (Anxiety/Neuroticism), QIII (Tough Poise), QIV (Independence) and QV (Control). Given the comprehensive sampling of Ss and variables across the personality sphere (Cattell and Krug, 1986) these results
appear to answer the query by McCrae and Costa (1987) and Zuckerman, Kuhlman and Camac (1988) among others, as to the number and nature of normal personality-type dimensions.

In the present study, the prediction equations provided in the 16PF Handbook were compared with those in the CAQ Manual, and both sets of equations were compared with those obtained by Krug and Johns (1986), which have now been released by IPAT as a supplement to the 16PF Handbook. Using data derived from Forms A and B of the 16PF, correlations were computed between the old and new 16PF second-order equations, between the old 16PF equations and the CAQ equations, and between the new 16PF equations and the CAQ equations.

RESULTS

Table I presents the correlations between the various sets of equations for the major second-order personality-type factors within the normal domain. While there are strong relationships between the various sets of equations, nevertheless, the third second-order equation (Tough Poise) does not reflect a similarly high correlation. The old 16PF QIII equation is discrepant with both the new 16PF QIII equation and the CAQ QIII equation. However, there is a relatively strong correlation between the CAQ and new 16PF equation for calculating QIII. Examination of the data failed to indicate that either extreme outliers or restriction of range on key factors (Factors A and I) were responsible for the attenuated correlations with QIII.

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Table 1

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Conclusions

It is concluded that computation of the second-order 16PF Factor QIII, based on the prediction formula as provided initially in the 16PF Handbook produces spurious results. Clearly, use of this particular formula over the past couple of decades may invalidate the outcomes and conclusions drawn from many studies reported in the psychometric literature involving the Factor QIII. It is therefore strongly recommended that only the new equation for calculating QIII (Krug and Johns, 1986) be employed in any future studies with the 16PF, and that re-examination of previous studies might be well advised in the light of the evidence now available.

REFERENCES


Table 1. Correlations between second-order factors using old and new 16PF equations and CAQ equations (N = 95)

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<tr>
<th>16PF new equations</th>
<th>CAQ equations</th>
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<td>I</td>
<td>II</td>
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<td>16PF old equations</td>
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<tr>
<td>I</td>
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16PF new equations | 16PF old equations |
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<tr>
<td>I</td>
<td>II</td>
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<tr>
<td>0.87</td>
<td>0.97</td>
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Correlations reported to two decimal places only. 16PF Forms A and B stems substituted for Part I of the CAQ.