

## DISCRIMINANT VALIDITY OF THE 'BIG FIVE' PERSONALITY TRAITS IN EMPLOYMENT SETTINGS

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The ability of the 'big five' personality traits to predict supervisors' ratings of performance is investigated using the Orpheus personality questionnaire. Orpheus is a broad spectrum work-based personality questionnaire containing 190 items. It generates scores on sixteen scales - five major scales, seven minor scales, and four audit scales. The major scales are Fellowship, Authority, Conformity, Emotion and Detail and are based on the 'big five' model of personality. The minor scales are Proficiency, Work-orientation, Patience, Fair-mindedness, Loyalty, Disclosure and Initiative, and are based on the Prudentius model of integrity. The four response audits are Dissimulation, Ambivalence, Despondency and Inattention, and are designed to screen for inappropriate responding. Supervisors' ratings on 245 subjects in a variety of occupations and employment settings are obtained on the Orpheus respondents. All of the 'big five' traits were found to have significant correlations with appropriate supervisors' ratings.

Studies of the relationship between job performance and personality have been summarised in two meta-analytic studies carried out by Barrick and Mount (1991) and Tett and Jackson (1991). In both these studies the most striking finding was that the 'big five' personality trait of Conscientiousness is the only consistent predictor of job performance. The other 'big five' dimensions of extraversion, neuroticism, openness-to-experience and agreeableness do, however, provide some predictive power in particular circumstances. Sackett and Wanek (1996) argue that the general predictive power of Conscientiousness comes about as a consequence of the close conceptual relationship between Conscientiousness and Integrity. They further suggest that a combined trait representing High Conscientiousness, Low Neuroticism and High Agreeableness is a surrogate for Integrity

and can explain all of the ability of the 'big five' personality traits to predict job performance. Furthermore, each of the three component traits, on their own, was, they argue, unable to add any predictive power to an Integrity measure. However, Sackett and Wanek focus their attention on the prediction of overall job performance. This may be unrepresentative in its capacity to mirror the way in which personality traits are actually applied on a day to day basis in organisations.

The present study looks at the ability of each of the 'big five' personality dimensions to predict those specific aspects of behavior which they are designed to assess, using the Orpheus personality questionnaire (Rust, 1996). Orpheus is a 190 item questionnaire which assesses 12 traits (5 major scales and 7 minor scales). The five Orpheus major scales are based on the 'big five' model of personality, interpreted within the context of work-related behaviors, beliefs, attitudes and interests. The scales (Fellowship, Authority, Conformity, Emotion and Detail) represent social, organizational, intellectual, emotional and perceptual aspects of personality respectively, and are based on the 'big five' traits of extraversion, toughmindedness, openness-to-experience, neuroticism and conscientiousness. A rating scale for supervisors was designed to assess the behaviors associated with each of these 'big five' dimensions.

## METHOD

Orpheus is a work based personality questionnaire that was developed specifically for use in working populations. As well as providing reliable measures of the 'big five' it also aimed to reduce correlations between these five traits to a minimum. The reliabilities and intercorrelations of the Orpheus 'big five' measures appear in Table 1.

TABLE 1  
INTERCORRELATIONS BETWEEN THE ORPHEUS MAJOR SCALES AND CORRELATIONS WITH SOCIAL DESIRABILITY IN THE STANDARDIZATION SAMPLE (N=423). SOCIAL DESIRABILITY IS ASSESSED BY THE INVERSE OF THE DISCLOSURE MINOR SCALE. SPLIT-HALF RELIABILITIES ARE SHOWN IN THE DIAGONALS.

	F	A	C	E	D	Lie
F: Fellowship	(.73)	.19	-.19	-.21	-.03	.05
A: Authority		(.77)	-.28	-.25	-.12	-.05
C: Conformity			(.76)	.15	.28	.11
E: Emotion				(.81)	-.06	-.20
D: Detail					(.73)	.29
Lie scale						(.76)

The Orpheus measure of Fellowship assesses the 'big five' trait of extraversion/ introversion. High Fellowship scorers are generally happier working with others or in a team, while low Fellowship scorers generally prefer work that requires a degree of independence. Authority assesses the 'big five' trait of tough-



vs. tender-mindedness, sometimes called "agreeableness". High Authority scorers can make tough decisions, while low Authority scorers generally adopt a more co-operative approach. The 'big five' trait of "openness-to-experience" is assessed by Conformity. High Conformity scorers are likely to have a preference for traditional ways of doing things and to respect established values, while low Conformity scorers often wish to do things differently and to seek out alternative solutions to problems. The 'big five' trait of neuroticism is assessed by the Emotion scale within Orpheus. High Emotion scorers, while often being of a nervous disposition, are likely to be sensitive to the feelings of others. On the other hand low Emotion scorers are likely to be more able to perform under stressful conditions but may lack caution. Finally, the 'big five' trait of conscientiousness is assessed by Detail. High Detail scorers generally excel at mundane tasks that require particular care, although they may become over-involved in minutiae. Low Detail scorers have less patience for routine tasks and prefer to see the wider view.

The scoring procedure for Orpheus involves within-subject standardization of responses, response audit, and estimation of missing data. Where up to five item responses are missing they are replaced by the population norms for these items. Standardization is carried out to generate stanine scales. A response audit is also provided which identifies extreme scores on Dissimulation (social desirability), Ambivalence (assessing the degree of contradiction), Despondency (faking bad), and Inattention (random or stereotyped responding).

Job performance was assessed using supervisor's ratings of characteristics. Each supervisor was asked to complete a check sheet for each respondent with five response categories for each of five pairs of characteristics. There was a positive and a negative characteristic for each target trait, so that acquiescence effects were canceled out. For Fellowship, the characteristics were 'Team skills' and 'Ability to work independently'. For Authority the ratings were for 'Ability to make tough decisions' and 'Ability to make friends with colleagues'. Conformity was rated in terms of 'Obedience to Company policy' and 'Ability to generate new ideas'. Emotion was assessed with 'Tendency to worry' and 'Level of self-confidence'. The ratings for Detail were in terms of 'Attention to detail' and 'Breadth of vision'. The response categories for each rating were 'below average', 'average', 'just above average', 'much above average' and 'exceptional'.

Orpheus was administered to 274 employees in a variety of occupations, ranging from junior technical and clerical staff to senior managers and professionals. A broad sample of work settings was sampled, including a major automobile manufacturer, a major police force, an industrial petro-chemical concern, a retail chain and a city financial institution. The occupations sampled included accountants, drivers, engineers and scientists, human resource personnel, insurance underwriters and claims negotiators, managers, police officers, sales and marketing staff, secretaries and clerks, security staff, teachers and trainers. The data were stand-



ardized within each respondent (Rust & Golombok, 1999). That is, for each completed questionnaire the mean and the standard deviation of all item responses was calculated, and the standard score for each item was computed as a z-score. This was carried out in order to eliminate response bias effects resulting from acquiescence. For each respondent, his/her supervisor was given the rating scale and asked to complete this and return it. Supervisors were 'blind' with respect to the results of the Orpheus testing.

## RESULTS

Data from supervisors was obtained from 245 of the respondents. There were 158 men and 86 women. The mean age of the sample was 30.40 years (s.d. = 11.66 years). Two hundred and twenty five of the respondents were white (Caucasian), the remainder being Asian (6), African or Afro-Caribbean (8) and 'Other' (5). These figures reflect the approximate proportions for these groups in the UK working population. The correlation coefficients between the Orpheus scores and supervisors ratings appear in Table 2. Supervisors' ratings were also correlated with the Orpheus Lie scale, however none of these correlations were statistically significant.

TABLE 2  
CORRELATIONS OF THE FIVE ORPHEUS MAJOR SCALES WITH SPECIFIED COMBINED SUPERVISORS' RATINGS. THERE WAS SOME MISSING DATA FOR THE SUPERVISORS RATINGS, SO THAT SAMPLE SIZES ARE 244 FOR CONFORMITY, 242 FOR DETAIL, 241 FOR AUTHORITY AND EMOTION, AND 239 FOR AUTHORITY

	ORPHEUS				
	F	A	C	E	D
Supervisors' ratings					
F	.26**	-.08	-.01	-.06	.01
A	-.01	.24**	-.10	-.13*	-.07
C	-.08	-.26**	.36**	.00	.15*
E	-.15*	-.26**	.10	.23**	.04
D	-.13*	-.17*	.25**	.03	.32**

To investigate discriminant validity, partial correlation coefficients were calculated for the relationship between the Orpheus trait and the related supervisors rating with (a) the 4 remaining 'big five' scales or (b) the four remaining supervisors rating scales partialled out. These results appear in Table 3. The effect of partialing out the Lie scale was also examined, but produced no important effects.

TABLE 3  
CORRELATIONS OF THE FIVE ORPHEUS MAJOR SCALES WITH SPECIFIED COMBINED SUPERVISORS' RATINGS, AND ALSO EQUIVALENT PARTIAL CORRELATIONS WITH THE REMAINING 'BIG FIVE' SCALES, OR THE REMAINING SUPERVISORS RATING SCALES AS PARTIAL CORRELATES.

	N	r	partial r with Orpheus	partial r with supervisors ratings
Fellowship	241	.26	.26	.27
Authority	239	.24	.20	.20
Conformity	244	.36	.30	.29
Emotion	241	.23	.23	.16
Detail	242	.32	.26	.28

NOTE: There are four variables partialled out for each partial correlation coefficient. Thus, the figure of .26 in the third column of the first row represents the correlation between Orpheus Fellowship and the supervisors' rating scale for Fellowship with the Orpheus Authority, Conformity, Emotion and Detail scales as partial correlates.

## DISCUSSION

From Table 2 it is clear that, while the Orpheus scale has a significant predictive relationship with its appropriate supervisors' rating scale, there are also a number of significant correlations with other scales. Thus, it could be argued that common factors between the 'big five', such as integrity, may be responsible for the results. However, the analysis reported in Table 3 suggests that any common factor has had a marginal effect on the results. Thus, Table 3 gives good evidence for discriminant validity.

It might be felt that some of these correlations are, albeit significant, rather small. However they compare very favorable with those reported in the literature for validity studies of this type (see Barrick & Mount, 1991; Tett & Jackson, 1991). It has become a common practice when reporting the validities of personality questionnaires in occupational settings to use an adjustment for attenuation, and this may well lead to inflated expectations in regard to the correlations to be found. It is not possible to apply such a correction for the present study as no solid estimate for the reliability of the supervisors' ratings are available. For information, the corrected correlations, had the reliability of the rating scales been .5, would have been .43 (Fellowship), .39 (Authority), .58 (Conformity), .36 (Emotion) and .53 (Detail). Thus, the relations found in the present study are, if anything, somewhat larger than most of those reported in the literature. One reason for this may be the very broad range of occupations and work settings sampled. Studies with less breadth may suffer from reduced correlation due to range restrictions.

Costa and McCrae (1992) argue that the 'big five' model is supported in four ways. (i) The five traits have high stability and are identified using different assessment techniques (e.g. both self-report questionnaires and peer ratings). (ii) The traits are compatible with a wide variety of psychological theories including



psychoanalytic, psychometric and folk-psychological, (iii) they occur in many different cultures, and (iv) they have a biological basis. There is good evidence for the first three, and the fourth, while debatable, is not essential to the model. Within Orpheus, each of the 'big five' factors is considered to be unique to a particular psychological domain related to the employment setting. The five domains are the social, organizational, intellectual, emotional and the perceptual, all of which are essential parts of our psychological life. Thus, individuals live their daily life in a social world comprising their relationships with other people. They also live in an organizational world in which their position is determined by hierarchies of social status. They exercise their judgment within an intellectual domain involving the use of reason and knowledge. They are driven moment to moment by their emotions. How they view the world, and what becomes significant in their perceptual field will determine the framework for their actions. A particular person's position with respect to each of these five domains gives a description of the functioning of his or her personality in the work setting.

Most 'big five' scales are based on an approach derived from the very considerable literature on the factor analysis of natural language trait descriptors (Galton, 1884; Thurston, 1934; Allport & Odbert, 1936; Fiske, 1949; Goldberg, 1990). While factor analysis was also utilized in the construction of Orpheus, this was based on a different approach in which an underlying theoretical model is postulated and items are chosen on the basis of fit to this model. This technique was originally used in the UK by Eysenck (1947) in the construction of the EPQ. While the former approach will very often produce five independent factors, the scales derived from them are not themselves independent unless based on factor scores. Such scores use each item five times and are consequently able to balance for trait inter-relationships. However, factor scores have several disadvantages. Firstly they are unstable across groups so that when the test is used on a sample that differs from that used in standardization it is difficult to feel confident in the precise loadings allocated to each item within each factor. Secondly, such models are more difficult to justify publicly as they are a step removed from the received notion of test scores based on the number of "correct" responses. Unless an item can be conceptually related to a trait it can be difficult to explain its inclusion in a particular scale. To avoid these problems a common procedure is to select those items from the full factor analysis which have the highest loadings on particular factors. However, when this is done the resultant scores are no longer direct measures of the 'big five' as they appear in the factor analysis itself, neither are they independent of each other. Effectively they have become interpretations of a statistical model somewhat distanced from psychological theory.

While no major claims can be made for the theoretical framework used by Orpheus, which presupposes a separate psychological domain for each factor, it does allow the five scales to be based on explicit constructs which are prior to the



statistical analysis. Factor analysis can then be used as a tool in test construction rather than as an end in itself. The requirement that correlations between each of the 'big five' scales be less than 0.3 to ensure a degree of independence addresses a set of common problems which are best examined in terms of individual traits.

One such issue has been the degree of concordance between extraversion and openness-to-experience. While extraversion almost invariably includes a social aspect, different extraversion scales vary in the extent to which impulsiveness items are included. This controversy owes its origin to Eysenck, who in the earliest versions of the EPQ (the Maudsley Personality Questionnaire), focused on the independence of the two traits of extraversion and neuroticism. Two factor solutions always provide the simplest model for the use of factor analysis in personality test construction. While the nature of the two factors that will emerge will always depend to some extent on which items are in the pool, it has long been known that for any wide scale sampling of natural language trait descriptors, the most likely two factors resemble extraversion and neuroticism. Either is likely to emerge as the first factor, and, once it has been identified, it is relatively easy to construct an independent second scale from prudent balancing across the remaining items in the pool. Unfortunately, as soon as the number of factors is increased beyond two, this structure is liable to disintegrate. Eysenck himself was able to generate an independent third factor of psychoticism only by removing impulsiveness items from his earlier extraversion scale (Claridge & Birchall 1978; Rust, 1975, 1987, 1988, 1989; Costa & McCrae, 1995). When the number of factors is further increased from three to five, impulsiveness tends to transfer to openness-to-experience rather than to psychoticism. Within Orpheus, the constraint on the size of the correlation between Conformity (Openness-to-experience) and Fellowship (Extraversion) has produced both Fellowship and Conformity scales less contaminated by impulsiveness. Impulsiveness is identified by the high Fellowship, low Conformity profile.

Another common confound has been between the 'big five' traits of conscientiousness and agreeableness. This has largely come about because almost all the development work on the 'big five' has been carried out in academic institutions using students as respondents. The friendly and conscientious student is highly valued by staff and fellow students alike and the benefit of this trait is seen as self-evident. However, although people low on "agreeableness" may not make ideal students, there are a very large number of them - and many are very successful in their careers. The experience of many occupational psychologists is that those with low scores on agreeableness and/or conscientiousness are not always the ne'er-do-wells that have been implied. Successful senior managers, and human resource managers in particular, very frequently have this profile, so that any positive qualities it may have do need to be addressed. By focusing on low correlations between Authority (inverse agreeableness) and Detail (conscientiousness),



and by reducing the mediating effect of social desirability, Orpheus has achieved a good degree of independence between these traits. This has led to an emphasis on the previously obscured merits of low scores on agreeableness and on conscientiousness in the Orpheus Authority and Detail scales respectively.

Within the Orpheus structure, an "agreeable" and altruistic outlook at work is seen as more appropriate for high performing junior staff and not necessarily a suitable quality for those who have to direct the activities of others. People who have managerial responsibilities may often see themselves as tough-minded or even "disagreeable". With the conceptualization of "disagreeable" respondents as high on Authority, it is possible to give recognition to their positive qualities, in particular their ability to make tough decisions and will to succeed.

The distinction between the Social and the Organizational domains, assessed by Fellowship and Authority respectively, also helps to disentangle the social quality of agreeableness which otherwise tends to relate its friendliness aspect to extraversion. By treating "agreeableness" as low Authority it is possible to distinguish well-meaning and kind but introverted individuals from their more demonstrative and ostensibly helpful colleagues. Thus, those high on Fellowship (extroverts) and high on Authority may be overbearing rather than friendly.

There has also been a tendency within working populations for low agreeableness (tough-mindedness) to correlate with high openness-to-experience. This is very likely an artifact introduced by the relationship between status and education. Tough-minded individuals are generally more senior and at a higher educational level. Such people tend to be more able, which in turn relates to lower scores on Conformity. The relationship between openness-to-experience and intellect in the form of divergent thinking has been widely explored in the literature (e.g. McCrae, 1987) where it is recognized that it is a mistake to treat openness-to-experience as merely a surrogate for intellectual ability. Openness-to-experience should perhaps be seen in the context of epistemology and the philosophical theory of knowledge rather than the more prosaic psychological concept of intelligence. Within Orpheus, the correlation between Authority and Conformity has been kept to a minimum to reduce the confounding effect of ability on openness-to-experience. Independently of their ability, low Conformity scorers aim to change their own ways of thinking, while high Conformity scorers are more willing to take things on faith.

Conscientiousness is interpreted within Orpheus as attention to detail, and placed in the perceptual domain as the trait of Detail, concerned with how and where we focus our attention. While the relationship between conscientiousness and attention to detail is well documented, relatively little attention has been paid to the attributes of low scorers on this trait. Where trait descriptors for low conscien-



tiousness have been given at all they have invariably been portrayed as extremely undesirable, using such terms as unreliable, lazy, hedonistic, and lacking in self-control and moral principles. In spite of this, individuals with scores at this end of the Detail scale often seem to be fully functioning and successful individuals! It is hoped that the Orpheus framework will address this injustice, and emphasize their ability to "pan out" from the narrow focus of the highly Conscientious individual. Low Detail scorers may be more able to use their intuition and to make use of a gestalt style of perception, recognizing that the whole is often more than the sum of its parts. They may perhaps epitomize the impressionist in contrast to the photographic mode of perception.

In conclusion, the present study demonstrates that all five of the 'big five' personality traits can have a role within job selection and staff development. Further work in the field might focus on the specific validity of each trait for particular utilities, rather than on over-broad assessments of job effectiveness.

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