



The OAD Survey - Taxonomy of General Traits

1. Introduction

The OAD Survey (Organization Analysis and Design) is an adjective-based organization diagnostic, selection, and development instrument comprising two matched questionnaires. Each questionnaire contains 110 identical adjectives. For the first set of 110 adjectives, respondents are asked to check those words which best describe themselves. For the second set of 110 items, respondents are asked to check those words that describe how they must behave in their current (or previous) job.

Both questionnaires comprise six distinct scales, defined below:

- **Assertiveness/Autonomy:** independence, need for control, self-confidence, resourcefulness;
- **Extraversion:** degree of social and people orientation guiding a person's behavior;
- **Patience:** degree to which individual needs system and predictability, degree of patience;
- **Detail-orientation:** concern for correctness, orderliness and structure, including sense of duty;
- **Emotional Control:** extent to which individual exercises control over emotions and actions;
- **Creativity:** degree of inventiveness and originality of thinking.

In addition, scores on the first four scales (Assertiveness/Autonomy, Extraversion, Patience and Detail-orientation) are summed to produce a cumulative score, termed '**Versatility Level**'. Versatility Level is regarded as an indicator of behavioral flexibility, with higher scores indicating more flexible individuals who are willing to step outside of their 'comfort zone' and who are better equipped to 'bounce back' following periods of insecurity or stress.

Each of the six principal scale scores is obtained by summing the number of checked items for that particular scale. This scale score is standardized by comparison with the total US dataset (N=234) and conversion to percentile score. Percentile scores are plotted on a website-generated graph according to decile position (ranging from 0-10). The Versatility Level score is not standardized but is reported as the numerical sum of the A, E, P, and D words checked, as appears in Figure 1, below:

Figure 1: Example OAD (Trait) output graph

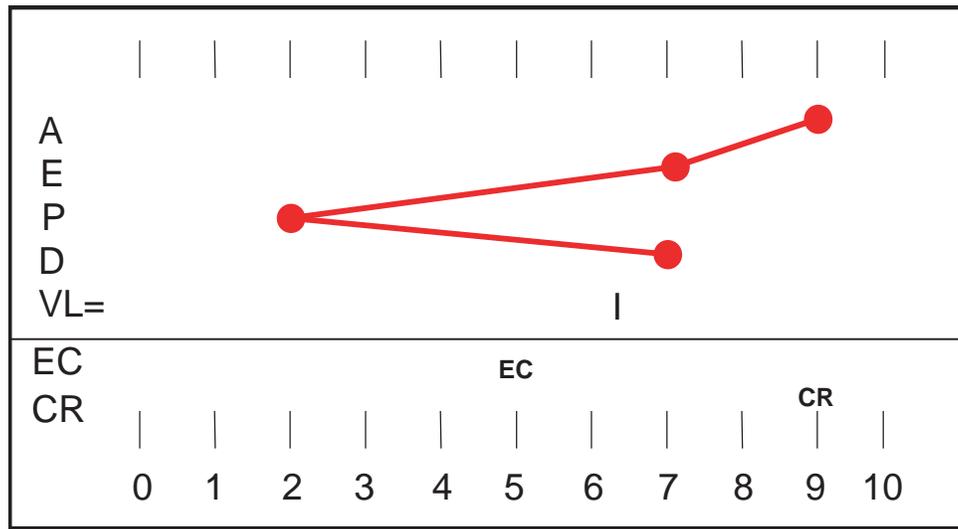


Figure 1 demonstrates that the respondent reports a 9th decile on (A) Assertiveness/Autonomy, a 7th decile on (E) Extraversion, a 2nd decile on (P) Patience and a 7th decile on (D) Detail-orientation. The position of the norm line or divider (represented by the 'I' character) denotes the mean decile value on summing these four scale scores. The Versatility Level (VL) score is reported as the number of A, E, P, and D words checked. The respondent also reports a 5th decile on Emotional Control (EC) and a 9th decile on (CR) Creativity.

The OAD describes the first four scale scores in terms of their *relative* position when compared against each other, using a 'norm line' as a 'marker' of the midpoint of the distribution. The Emotional Control and Creativity scales are reported as decile scores only and are reported in isolation.

Similar calculations are undertaken with the second (Perceived Job Behaviors) of OAD's two-part questionnaire, with obtained scores compared with the US dataset (N=234) in order to produce percentile and then decile scores. Scores are plotted on a similar graph to that shown above.

The reader is then provided series of narrative outputs:

- Output graphs (similar to that shown above) for both 'Traits' and 'Perceived Job Behaviors';
- A summary of the individual's trait profile;
- A summary of potential motivating needs for that individual;
- A summary of perceived job behaviors.

These data are intended for use by the user in a number of ways:

- Use of OAD as one 'diagnostic' for management and/or organization development activities;
- Use of OAD Traits and Perceived Job Behaviors results as a basis for individual development, by comparing the two sets of data. Where substantial differences in

the profiles appear, it is likely that the individual perceives a need to make radical behavioral changes in order to perform his/her current role more effectively;

- Use of both sets of output to identify individuals who may feel 'under- or over-utilized' in their present positions and to investigate causes;
- Use of the Perceived Job Behaviors output to gather data on a particular job role/position, particularly during the initial phase of a job analysis;
- Use of OAD Traits output alone as one variable in the recruitment/selection process, particularly in forming a basis for subsequent interview.

2. CONTENT VALIDITY

Over the period 1987-1990, Michael Gray, managing partner of OAD LLC, a Boston-based consulting firm, developed, refined and validated the OAD Survey over four major administration sessions drawing on over 1,000 US participants.

Based on over 20 years' experience of consulting in the Human Resources field, Gray (a Quantitative Analysis M.A. from Syracuse University) resolved to develop an adjective-based instrument which was aimed to improve on existing personality instruments in the following areas:

- Speed of completion;
- Reducing error through use of adjective-anchored inventory;
- Providing an indication of the respondent's 'fit' with their current job role in order to identify possible current and future problems for individuals, teams, and departments.

Gray based the development of his initial item pool on the research underpinning McRae and Costa's (1987) research into a five-factor model of personality, and on Cattell's extensive research into personality (e.g. Cattell, Eber and Tatsuoka, 1970). Drawing on his own knowledge of the world of work, as well as on the above research, Gray developed a pool of around 250 adjectives, which he felt tapped into those elements of personality most critical to success at work. Having run various pilot sessions with colleagues to ensure accessibility and comprehensibility of items, and to ensure that the domains covered by the items were as comprehensive as possible, Gray undertook a four-year validation program of the OAD Survey. This validation program involved four major administrations of the instrument to over 1,000 US respondents between 1987 and 1990 (with samples numbering 110, 289, 413 and 234 cases, evenly split for gender) and saw the original 250-strong item pool reduced to 110 items through iterative factor and item analysis. A construct validation exercise during this period also saw the OAD administered concurrently with the 16-PF instrument to explore relationships between component scales.

The six-factor instrument that emerged in 1990 had thus been derived on a largely empirical basis from extensive factor and item analysis, with a sound basis in personal experience and in the published work of major personality theorists such as Cattell and Costa and McRae.

While relationships between the six OAD (Trait) factors (see Introduction above) and those included in Cattell's 16-PF series, and Costa and McRae's NEO series are apparent (both intuitively and statistically – see Section 4, below, for details on the

statistical relationships between OAD's and the 16-PF instruments' component scales), Gray incorporated an additional scale, 'Versatility Level', rarely seen in personality research. The Versatility Level scale was calculated by simple summation of the Assertiveness/Autonomy, Patience, Extraversion and Detail-orientation scales and was intended to provide an overall indication of the behavioral flexibility and "general activity level" exhibited by each respondent. Based largely on his own experience of work, Gray believed that the level of 'Versatility' exhibited by the individual could have a significant effect on experienced stress at work, acting as a buffer or coping mechanism when the individual was required to undergo a period of transition or insecurity. This proposition has been researched by Gray on a small scale, using a stress indicator measure, with some encouraging results (see Section 4.4 for more details).

3. RELIABILITY

Internal consistency reliability analyzes were carried out with the US dataset (N=234) using both Cronbach's alpha criterion and corrected split-half reliability estimates. Results appear below.

Table 1: Internal consistency reliability estimates for the six principal scales of OAD – Traits for US (n= 234)

TRAIT	Number of items	Sample size (N)	Cronbach's Alpha	Corrected Split-half
Assertiveness	17	234	.838	.831
Extraversion	16	234	.812	.842
Patience	13	234	.771	.798
Detail-orientation	22	234	.832	.822
Emotional control	18	234	.828	.793
Creativity	16	234	.879	.868

Table 2: Internal consistency reliability estimates for the six principal scales of OAD - Perceived Job Behaviors for US (n=234)

PERCEIVED JOB BEHAVIORS	Number of items	Sample size (N)	Cronbach's Alpha	Corrected split-half
Assertiveness	17	234	.846	.835
Extraversion	16	234	.816	.832
Patience	13	234	.756	.767
Detail-orientation	22	234	.848	.814
Emotional control	18	234	.870	.795
Creativity	16	234	.912	.883

All scales exceed the minimum of .7 suggested by Nunnally (1978) and Kline (1986; 1993b; 1994), and indicate that they are reasonably stable.

4. CONSTRUCT VALIDITY

4.1 Introduction

Demonstration of construct validity is crucial in ensuring the theoretical and empirical robustness of a psychometric instrument's component dimensions. A number of techniques are available for the investigation of a personality instrument's construct validity, most notably conducting correlation studies with well-established measures of personality, and investigating the internal factor structure of the instrument via factor analysis methods.

By making explicit links between OAD dimensions and scales from existing personality-based instruments, evidence may be obtained as to the degree to which the OAD is tapping into 'target' constructs. For example, by correlating OAD's 'Extraversion' and 'Detail-orientation' dimensions with scales in alternative personality questionnaires that purport to assess similar constructs, it is possible to assess the degree of convergence (similarity) and divergence (dissimilarity) in these relationships. Where an expected *a priori* relationship between scales is actually obtained, this provides evidence for convergent validity. Where two scales are not expected to report a significant relationship, evidence for divergent validity is obtained.

Examining the internal structure of a psychometric instrument is also crucial to ensure that the component dimensions of the instrument are measuring *independent* constructs. Without this independence, it is possible that scale dimensions are tapping into the same, or very similar, constructs, thus reducing the utility of the scales. This is most often achieved using factor analysis techniques, which allow exploration of the correlation relationships between all items within a psychometric instrument, to identify those items that 'cluster' together, suggesting the presence of a single underlying construct.

4.2 Relationships between OAD and existing measures of personality

4.2.1 OAD (Trait) and 16-PF

A study was undertaken by OAD LLC to investigate the relationships between OAD's component scales and those of an existing and well-regarded personality instrument. This consisted of the administration of both OAD Survey and 16-PF (Form C, 1978) to 234 US participants in the summer of 1990. Four of 16-PF's 16 component dimensions did not produce significant correlations and are excluded from the table, with the remaining 12 dimensions as follows:

- **A (Outgoing)** – interest in, and readiness to become warmly involved with others;
- **E (Dominance)** – degree to which an individual imposes his/her will on others;
- **F (Talkative)** – degree to which an individual is enthusiastic and cheerful;
- **G (Conscientious)** – willingness to accept and follow rules of conduct; ordered;
- **H (Adventurous)** – degree to which an individual feels at ease in social situations, carefree;
- **I (Sensitive)** – Tender-minded, insecure; acts on sensitive intuition;
- **L (Suspecting)** – degree to which an individual questions motives of others;
- **M (Imaginative)** – absorbed in ideas, creativity, interested in theory;
- **Q1 (Experimenting)** – openness to new experiences, free-thinking;
- **Q2 (Social Approval)** – degree to which an individual prefers to make choices and decisions independently of others;
- **Q3 (Controlled)** – exacting; precise; behaves in an orderly and consistent manner;
- **Q4 (Relaxed)** – level of physical tension experienced, tranquil, composed.

Spearman's Rho correlations between each of OAD Traits 6 component scales and the 11 16-PF scales are summarized in Table 2, below. Please note that only those correlations exceeding $p=.01$ are included in the table for the sake of clarity.

Table 2: Correlation analysis – OAD and 16-PF (n = 234)

16PF4 scales	OAD Scales →					
	A	E	P	D	EC	CR
A (Outgoing)		.253**				
E (Dominance)	.456**	.183*	-.181*			.303**
F (Talkative)	.188*	.392**	-.198*			.200*
G (Conscientious)				.238**	.182*	
H (Adventurous)	.359**	.416**	-.206**			.281**
I (Sensitive)					.388**	
L (Suspecting)	.193*					
M (Imaginative)	.178*					.279**
Q1 (Experimenting)	.309**					.462**
Q2 (Social Approval)		.266**				
Q3 (Controlled)			.173*	.245**	.412**	
Q4 (Relaxed)			.201*			.

Levels of statistical significance: * >.01 **>.001

To summarize these findings:

- OAD Assertiveness/Autonomy ('A') is significantly correlated with 16-PF's Dominance, Adventurous, and Experimenting factors. A moderate degree of construct validity for this factor, then, can be inferred from the study findings. Clearly the OAD Assertiveness and Creativity scales converge.
- OAD Extraversion ('E') correlates significantly with 16-PF's Outgoing, Talkative, Adventurous, and Social Approval factors. Interestingly, these are precisely the factors used by NFER-Nelson (publishers of the 16-PF series) to calculate the global factor of 'Extraversion' (along with Privatness, which was not included in the above study). This provides excellent evidence for the discriminant and convergent validity of OAD's 'E' dimension.
- OAD Patience ('P') significantly correlates with 16-PF's Adventurous (negative loading), suggesting that those respondents reporting high 'Patience' scores are less likely to feel at ease in new or unexpected situations. This is an expected relationship. OAD 'P' also loads on 16-PF's Relaxed factor, an expected relationship.
- OAD Detail-orientation ('D') correlates significantly with 16-PF's Conscientious and Controlled factors. This is in line with *a priori* expectations since these factors address traits such as meticulousness, forward planning, and self-discipline. Good evidence, then, is found for OAD 'D's convergent and discriminant validity with 16-PF.
- OAD Emotional Control ('EC') correlates significantly with 16-PF's Sensitivity factor. This is in line with expectations since these factors address traits such as tough- and tender-mindedness and logical evidence vs. sensitive intuition. This construct also correlates significantly with the Perfectionism factor. This makes some intuitive sense since several of the 'EC' items address overly self-discipline, distractibility, absent-mindedness, etc.
- OAD Creativity ('CR') correlates significantly with 16-PF's Dominance, Adventurous, Imaginative, and Experimenting. Relationships with Imaginative and Experimenting are in line with expectations, since these dimensions address creativity of thinking and openness to new ideas. However, the significant relationships with Dominance and Social boldness undermine the divergent validity of OAD's 'CR' dimension to a large extent.

4.3 Factor structure of OAD (Trait): UK dataset

4.3.1 Introduction to factor analysis

Factor analysis techniques can be used to explore the underpinning structure of items comprising a psychometric instrument such as OAD. In simple terms, these techniques are able to assess correlation relationships between all items within an instrument, thereby determining which items 'cluster' together most strongly. In this way, the relative

independence of the component dimensions making up a personality instrument such as OAD may be assessed, as can relationships between these dimensions.

In order to conduct factor analysis, the sample dataset must demonstrate a number of key characteristics:

1. The sample should be as heterogeneous as possible (Kline, 1993a);
2. The sample should match as closely as possible the target population for which the instrument is intended, in this case the US adult population (Kline, 1997);
3. Sample size must be large enough to reduce standard error of correlations to negligible proportions. An absolute minimum acceptable sample size is widely regarded as 100 with 200+ preferable (Kline, 1993a, 1997);
4. Subject: item ratio requires a 3:1 relationship between respondents and the number of items included in a study. In the case of OAD 110 items, a minimum sample size of 330 respondents should be required from any one sample (Barrett and Kline, 1981);

4.3.2 Suitability of the dataset for factor analytic techniques

The dataset (n=234) should be larger, but all of the other requirements for factor analysis are upheld. The dataset is heterogeneous, comprising 48% males, 52% females, and 10 occupational groups including executives/managers, salespeople, clerical staff, production staff, etc. The Olken-Meyer coefficient of sample representation was .897. The high coefficient for a relatively small sample size was the result of paring done from the previous administrations of the OAD Survey.

A principal components factor analysis procedure was selected due to the complexity of the correlation matrix underpinning the OAD (Trait). A Scree test suggested the extraction of 6 items, a minimum eigenvalue analysis suggested extraction of 8 items. Given *a priori* expectations (for the presence of six factors), in addition to the Scree test findings, six factors were rotated to simple structure using an oblique method (Direct Oblimin), which does not assume orthogonality (independence) of factors. The structure, rather than the pattern, matrix was used to interpret findings since the structure matrix reports correlation relationships rather than beta weights. Any factor loadings exceeding .35 within the appropriate construct are reported in the Table 4, below. This minimum criterion was used to identify and eliminate or recode words that fall below an acceptable level. Coefficients above .2 that fall outside of the designated construct are reported.

Table 4: Structure matrix for principal components factor analysis of OAD (Trait) conducted with US dataset (N=234), rotated to a 6-factor simple structure via direct oblimin.

Item	Factor 1 (Assert's/ Creativ'y)	Factor 2 (Emotion' I Control)	Factor 3 (Detail)	Factor 4 (Extrav'n)	Factor 5 (Patience)	Factor 6 (NA)
A1	.650		.237			
A2	.648		.209			
A3	.582		.203			
A4	.510					

Item	Factor 1 (Assert's/ Creativ'y)	Factor 2 (Emotion' I Control)	Factor 3 (Detail)	Factor 4 (Extrav'n)	Factor 5 (Patience)	Factor 6 (NA)
A5	.428					
A6	.437					
A7	.484			-.288		
A8	.649			-.340		
A9	.600			-.322		
A10	.582					
A11	.557		.222	-.290		
A12	.646		.202	-.308		
A13	.544					
A14	.446			-.299		
A15	.446					
A16	.485		.212			-.337
A17	.412		.122			
CR1	.487					
CR2	.538					
CR3	.574					-.359
CR4	.626					-.333
CR5	.505					
CR6	.601			-.295		
CR7	.527					-.313
CR8	.655			-.256		
CR9	.636					
CR10	.704					
CR11	.549		.326			
CR12	.776			-.229		
CR13	.687					
CR14	.666			-.271		
CR15	.709	.347				
CR16	.647		.314			
D1	.285		.438			
D2			.649			
D3			.491	-.292		
D4			.407			-.433
D5			.547			
D6			.365		-.332	
D7			.526			
D8			.627			
D9			.662			

Item	Factor 1 (Assert's/ Creativ'y)	Factor 2 (Emotion' I Control)	Factor 3 (Detail)	Factor 4 (Extrav'n)	Factor 5 (Patience)	Factor 6 (NA)
D10		.299	.456			
D11			.372		-.244	
D12			.496			-.294
D13			.713			
D14		.546	.581			
D15		.301	.391			
D16			.594			
D17			.488			
D18	.292		.425			
D19	.414		.464			
D20			.437	-.337		
D21			.416			
D22			.584			
E1				.516		
E2	.308			.427		
E3				.487		
E4				.400		
E5				.660		
E6				.607		
E7			.300	.492		-.356
E8				.659		
E9				.582		
E10				.407		
E11				.466		
E12	.307			.489		
E13				.469		
E14				.460		.284
E15				.621		
E16				.621		
EC1		.376				
EC2		.449			-.316	
EC3		.587				
EC4		.358				
EC5		.558				
EC6		.653				
EC7		.469				
EC8		.475				
EC9		.517				

Item	Factor 1 (Assert's/ Creativ'y)	Factor 2 (Emotion' I Control)	Factor 3 (Detail)	Factor 4 (Extrav'n)	Factor 5 (Patience)	Factor 6 (NA)
EC10		.687		-.306		-.312
EC11		.587				
EC12		.694				
EC13		.479				
EC14		.569				-.227
EC15		.457				
EC16		.592				
EC17		.497				
EC18		.585				
P1				-.335	-.489	
P2					-.486	
P3				-.346	-.644	
P4					-.515	
P5					-.464	
P6					-.475	
P7					-.588	
P8					-.571	
P9	.221		.302		-.361	
P10					-.543	-.448
P11	.283		.309		-.446	
P12			.294		-.568	-.333
P13					-.507	

This principal components, obliquely rotated (Direct Oblimin) forced 6-factor solution, explains 30.28% of the total variance. Converging in 24 iterations, Factor 1 (eigenvalue = 12.36) explains 12.1% of the variance, Factor 2 (eigenvalue = 5.55) explains 5.45% of the variance, Factor 3 (eigenvalue = 4.86) explains 4.76% of the variance, Factor 4 (eigenvalue = 4.01) explains 3.93% of the variance, Factor 5 (eigenvalue = 2.30) explains 2.26% of the variance and Factor 6 (eigenvalue = 1.80) explains 1.76% of the variance.

Table 5: Factor Correlation Matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00				
Factor 2	-.029	1.00			
Factor 3	.231	-.057	1.00		
Factor 4	-.165	-.029	-.007	1.00	
Factor 5	-.044	.179	.162	-.097	1.00

With the exception of Assertiveness and Creativity being highly intercorrelated, the factors are independent of each other with a note that there is a small positive correlation between the Assertiveness/Creativity factor and Emotional Control.

4.3.3 Summary of analysis

The solution shows good evidence for the existence of five independent constructs underpinning the OAD (Trait) instrument. The following dimensions, then, exhibit independence and high item-factor loadings in line with *a priori* expectations:

- Detail-orientation;
- Extraversion;
- Patience;
- Emotional control.

While some items appeared to load on unexpected factors, 85-95% of items from these dimensions loaded as expected.

As Table 4 shows, the two remaining dimensions, Assertiveness/Autonomy and Creativity load together on a single factor (Factor 1). This is not necessarily expected [despite Cattell et al's (1970) contentions] and suggests a proximal relationship between these two OAD (Trait) dimensions. On running a forced two-factor principal components analysis with the items contributing to OAD (Trait)'s 'A' and 'CR' dimensions, they were found to load separate factors, although retained a high degree of shared variance. This suggests that there are differences between Autonomy and Creativity, but are so closely interlinked as to make it difficult to 'tease' apart.

Overall, this suggests that while the Detail-orientation, Extraversion, Patience and Emotional control scales exhibit a high degree of empirical independence, the other two scales are too closely correlated to be treated as *empirically* independent.

4.4 OAD and experienced stress

One of Gray's principal tenets is that the OAD scale 'Versatility Level', combining the Assertiveness/Autonomy, Extraversion, Patience and Detail-orientation scales, is able to indicate the extent to which an individual is able to cope under conditions of uncertainty, threat, or change. A research study was carried out to investigate this proposition using a sample of 124 UK employees (69% male) to whom OAD (Trait) and a stress indicator instrument, the 'Pressure Management Indicator' (PMI) (Cooper and Williams, 1996), were administered simultaneously.

The PMI was constructed by Cooper and Williams (1996) following a thorough review of an earlier iteration of the instrument, the Occupational Stress Indicator (Cooper, Sloan and Williams, 1988). The instrument contains a number of component scales relating to

effects of pressure, sources of pressure, personality and coping styles. Of particular interest to the present study were the relationships between the OAD's Versatility scale and the following PMI scales:

- **Effects: contentment** – degree of contentment/anxiety reported;
- **Effects: resilience** – extent to which the individual is able to 'bounce back'.

Relationships between these variables appear in Table 6, below:

Table 6: Correlation relationships between OAD Versatility and PMI 'Effects' scales

	Contentment	Resilience
OAD Versatility	r=.276 p=.003	r=.286 p=.002

Table 6 shows that respondents who reported greater levels of Versatility, according to their OAD (Trait) responses, also reported higher levels of contentment (lower anxiety) and a greater degree of resilience (were more able to 'bounce back' when necessary). This is consistent with Gray's original proposition that the Versatility scale assesses resilience under conditions of perceived stress. OAD LLC plans further research into this area to uncover relationships between the Versatility scale and other measures of perceived stress, as well as measures of behavioral flexibility.

4.5 Summary of findings

Overall, the OAD instrument performs impressively when relationships between its component scales and that of a well-regarded existing personality instrument (16-PF) are assessed. This performance is replicated to a large extent when the instrument is placed under factor analytic scrutiny. The OAD (Trait)'s Extraversion and Detail-orientation scales in particular were notable for their convergent and divergent relationships with target constructs, as well as their independence under factor analysis.

The Autonomy/Assertiveness, Patience and Creativity scales also demonstrated good construct validity when set against target constructs, with Patience reporting a high level of independence from other dimensions under factor analysis. OAD (Trait)'s Emotional Control scale exhibited some divergence from 16-PF measures, although its empirical independence from other OAD (Trait) dimensions was demonstrated under factor analysis.

A close empirical relationship between the Autonomy/Assertiveness and Creativity scales was reported under factor analysis, suggesting that these two dimensions may be tapping into a similar construct, perhaps 'independence of thinking'.

The Versatility 'VL' scale demonstrates a close relationship with Cooper and Williams' (1996) Pressure Management Indicator's (PMI's) 'contentment' and 'resilience' scales, suggesting that the 'VL' scale may indeed tap into levels of resilience and ability to 'bounce back' following periods of experienced stress.

5. CRITERION VALIDITY

5.1 Introduction

Criterion-related validity pertains specifically to the relationship between an instrument's component scales/dimensions and external criteria of interest. In the case of an instrument intended for selection and development purposes, such external criteria could include work performance indicators, degree of reported satisfaction, level of commitment to the employing organization, etc.

Criterion validation studies generally assess the degree of relationship between an instrument's component dimensions and target criteria via correlation and/or regression techniques. In this way, it is possible to identify those dimensions of an instrument that are *most predictive* of target criteria. Work by Schmidt and Hunter (1977) and by Hunter, Schmidt and Jackson (1982) established the principle of *validity generalization*. This principle concerns the generalization of criterion-related validity findings within a specific setting (e.g. a sales or production environment) to other, similar, settings, as long as certain critical elements are matched (e.g. job characteristics). This work is recognised by the UK research community and, more formally, by the US by the Equal Employment Opportunity Commission (EEOC), who use it as a basis for establishing the criterion-related validity of assessment and selection instruments.

A number of studies have been undertaken by OAD LLC to assess the criterion validity of OAD. Most of these are small scale and sample-specific, in that they attempt to link OAD dimensions with company-specific performance criteria. Nonetheless, these studies provide a useful insight into the relative power of OAD in predicting performance at work. This section contains details of three such studies. The first was conducted using a sample of 46 sales associates from a fashion retail organization in the US. The second was undertaken with a sample of 32 retail store managers in the US and the third, with 73 management staff from a restaurant chain in Canada. Summary reports are outlined below.

5.2 Study 1 - Fashion sales associates

Forty-six sales associates were selected as representative of the total sales population of a US fashion retail organization. All study participants were required to complete OAD (Trait), with performance data collected from them for the first 11 months of 1994. Performance data included:

- Actual sales achieved;
- Degree to which quota exceeded;
- Hours worked per week;
- Total number of customers;
- 'Multiple count' (proportion of multiple sales made per customer);
- Sales per hour;
- Units sold per transaction.

Pearson's product moment statistic was used to assess the degree of relationship between each performance criterion and each of OAD (Trait)'s six component scales, in addition to each difference between each of the component scales (e.g. the decile difference between 'A' and 'D', for example). Statistically significant relationships appear in Table 7, below:

Table 7: Statistically significant correlation relationships between OAD (Trait) dimensions and performance criteria for sales associates

Performance criterion	OAD (Trait) dimension/difference	Direction (sign) and degree (p) of relationship
Actual sales achieved	Emotional Control	(-) .006
Degree to which quota exceeded	Versatility	(-) .008
Hours worked per week	Emotional Control	(-) .002
Total number of customers	Emotional Control	(-) .004
'Multiple count' (proportion of multiple sales made per customer)	Emotional Control	(-) .016
Sales per hour	No relationship	NA
Units sold per transaction	Detail-orientation Versatility	(+) .012 (+) .038

These findings suggest that sales associates who are more guided by their feelings (lower EC) and are less controlled in expressing their emotions are more likely to achieve higher sales, work longer hours, and generate more (and more lucrative) customers. Sales associates who are conscientious and detail-oriented (higher D) and who appear to possess greater versatility in their trait profiles (higher VL) are more likely to sell a greater proportion of product per transaction. Finally, and perhaps surprisingly, those sales associates who possess greater versatility (higher VL) and less likely to exceed their stated sales quota.

It is perhaps surprising that the OAD (Trait)'s Extraversion dimension reported no significant relationships with the target performance criteria since this factor has been cited elsewhere as particularly predictive of sales performance (e.g. Corr and Gray, 1996). The finding that Versatility Level (VL) was negatively related to meeting sales quotas was also surprising, although the study authors stress caution when interpreting this result due to anomalies in the way in which the criterion is expressed.

5.3 Study 2 – Retail store managers

Thirty-two retail store managers from the automotive parts industry participated in the second study, which saw their six-monthly performance during the first half of 1994 correlated with results from OAD (Trait). Performance data collected were as follows:

- **Quota** – percentile score against established sales volume quota;
- **Phone/store service** – 'mystery shopper' index, obtained by visiting/phoning each store and requesting information regarding particular products;
- **Retail green sheet** – internal store evaluation undertaken by District Manager;
- **Manager's Personal Performance Index (PPI)** – composite score comprising all performance indicators.

Pearson's product moment statistic was used to assess the degree of relationship between each performance criterion and each of OAD (Trait)'s six component scales, in addition to each difference between each of the component scales (e.g. the decile difference between 'A' and 'D', for example). Statistically significant relationships appear in Table 8, below:

Table 8: Statistically significant correlation relationships between OAD (Trait) dimensions and performance criteria for retail store managers

Performance criterion	OAD (Trait) dimension/difference	Direction (sign) and degree (p) of relationship
Quota	Detail-orientation	(+) .04
Phone/store service	No relationship	NA
Retail green sheet	Detail-orientation-Extraversion Detail-orientation-Patience	(+) .02 (+) .04
Manager's PPI	No relationship	NA

Table 8 suggests that the OAD (Trait)'s 'Detail orientation' dimension ('D') may be a critical predictor of performance for retail store managers. Those managers with 'D' ratings significantly higher than ratings of Extraversion and Patience achieved better internal reviews from District managers. Those managers with high 'D' ratings also achieved higher quota ratings.

5.4 Study 3 – Restaurant management staff

Seventy-three managers and assistant managers from a Canadian restaurant chain participated in the third study that involved concurrently administering OAD (Trait) and collecting performance data from the organization in the following areas:

- **Tenure** – length of employ with the organization;
- **Composite performance** – aggregated using an ordinal rating scale ranging from 'A' (exceeds standards) to 'X' (failing), across 14 separate performance indicators.

Pearson's product moment statistic was used to assess the degree of relationship between each performance criterion and each of OAD (Trait)'s six component scales, in addition to each difference between each of the component scales (e.g. the decile difference between 'A' and 'D', for example). Statistically significant relationships appear in Table 9, below:

Table 9: Statistically significant correlation relationships between OAD (Trait) dimensions and performance criteria for restaurant management

Performance criterion	OAD (Trait) dimension/difference	Direction (sign) and degree (p) of relationship
Composite performance	Extraversion-Patience	(+) .0001
	Extraversion-Detail-orientation	(+) .0001
Tenure	Autonomy/Assertiveness	(-) .04
	Extraversion	(-) .02
	Emotional Control	(+) .004

As regards composite performance in the job, Table 9 suggests that OAD (Trait)'s Extraversion dimension may be a critical predictor. Those management staff who reported a high Extraversion rating compared with Patience and Detail-orientation ratings also achieved higher overall performance ratings.

Interestingly, study findings also showed that performance was significantly *negatively* related to organizational tenure ($p=.04$). Thus, the finding that long-serving staff reported lower ratings of Extraversion was unsurprising.

5.5 Summary

Criterion-related validation is crucial to ensure that an instrument used for selection and/or development is statistically related to the 'real-world' criteria it sets out to predict. Schmidt and Hunter's (1977) pioneering work in validity generalization make it possible to generalize predictive findings obtained within a specific occupational setting to a wider population, as long as key job characteristics are equivalent.

The example studies summarized in this Section provide an indication of the potential of OAD (Trait) in predicting performance within various occupational and organizational environments. Clearly, users of OAD benefit most greatly from the instrument by undertaking their own 'local' validation study in order to link performance directly to OAD findings within their own organization. OAD LLC provides this service as part of the OAD annual retainer.

6. TEST BIAS

6.1 Introduction

When constructing a psychometric instrument, especially one designed for use in a selection setting, it is critical to ensure that specific groups completing the instrument are not unfairly disadvantaged due to inherent biases in that instrument. Biases can derive from the following sources (Rust and Golombok, 1999):

- **Item bias** – individual items are biased towards specific groups;
- **Intrinsic test bias** – the test is constructed and standardized using a group unrepresentative of the population for whom it is ultimately intended;
- **Extrinsic test bias** – the test discriminates against a specific group due to factors outside the scope of the test itself but leading to significantly different results for that group when compared with the population against which the test has been standardized.

6.2 Extrinsic test bias

Relatively little research has been undertaken with OAD (Trait) examining potential adverse impact with ethnic groups. Data pertaining to ethnic origin is being collected and to date there are no indications of bias, but more data is necessary. Gender data, however, and gender differences across the instrument's 6 scales may be assessed. Table 12, below, shows mean differences by gender for each OAD (Trait) scale along with results of significance tests comparing the mean values. The sample includes 1,000 US males and 1000 US females.

Table 12: Comparison of male and female mean scores on OAD (Trait), 2001

Scale	Mean (Male)	Mean (Female)	Standard deviation (Male)	Standard deviation (Female)	t-test significance
A	8.3	7.9	4.6	4.1	p=.008
E	8.5	8.6	3.3	3.4	ns
P	5.	5.7	2.	2.6	p=.001
D	9.8	10.1	4.3	4.3	ns
V	33.2	32.9	5.7	5.5	ns
EC	3.9	3.6	2.1	2.2	ns
CR	8.6	8.4	3.8	3.8	ns

Table 12 shows that significant differences exist between the sexes on two of the OAD (Trait) scales, Assertiveness and Patience. This is similar to findings with many personality questionnaires (e.g. NEO, 16-PF, MMPI, CPI, EPQ, etc.). In general, women score slightly lower in Assertiveness and slightly higher in Patience than men. However, the standardization of scores lessens these differences in actual output. Resolution of these differences is a social issue, if, in fact, resolution is necessary.

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