Saville Consulting Wave Professional Styles Handbook

PART 4: TECHNICAL

Chapter 20: Validity

20.0 Validity

If making better decisions about people is important, then it is essential for an assessment instrument to provide evidence of its validity.

This chapter is divided into two parts. The first part focuses on construct-related validity evidence and the second part focuses specifically on criterion-related validity evidence. Because validity is fundamental and central to effective test application, this chapter begins with a general discussion of validity. It continues by offering perspectives upon validity which are important underpinnings for the user in understanding what makes the Wave Styles questionnaires different from other personality questionnaires.

How do we know that a test or an assessment works and actually does what it claims to do? How do we know if the inferences and decisions made using one assessment are any better than another? How can we know which assessment tools are most accurate and will maximize the amount of benefit derived from the information provided? Which tool is the best investment for our organization?

These and other related questions are fundamental to the development and continuous improvement of assessment practices and tools in the workplace. These questions directly relate to the validity of a test or assessment.

What is Validity?

Wave Styles assessments have been designed to maximize validity in forecasting overall effectiveness at work and key workplace competencies.

> Validity is a unitary concept. It is the degree to which all the accumulated evidence supports the intended interpretation of the test scores for the proposed purpose.
>
> *Standards for Educational and Psychological Measurement,*
> *American Psychological Association 1999*

Accumulated evidence can come from many places. Today's understanding of validity evolved from the notion that there are different types of validity evidence, and it is important to understand these aspects of validity evidence and how they relate to Wave Styles assessments. These aspects of validity evidence help to support different inferences that can be made from test scores.

Predictive – Predictive Validity – a type of criterion-related validity evidence. This type of evidence is particularly applicable when one wishes to make an inference from a test or assessment score about the test taker's position on another independently evaluated criterion variable at a later date.

An example of a predictive validation study would be to investigate if an assessment designed to forecast sales potential correlated with future sales performance. Such a validation study might be based on the identification of critical sales behaviors through a job analysis study. This leads to an assessment being selected that purports to measure the sales behaviors in question. This

measure is then administered to applicants for a sales job – but the assessment scores are not used to decide which sales applicants are actually hired. The job analysis and the selection of the test lead directly to an a priori hypothesis that higher test scores will be related to better sales performance (which could be measured, for example, by sales revenue generated in a quarter). Time goes by and the newly selected sales staff get on with their jobs. A year later (or at an appropriate time to judge) sales performance is collated and analyzed to see if higher test scores do generate more sales revenue. The presence of an association or correlation between assessment results and later how the sales staff perform can then be evaluated. Typically, the organizer of the study may consider how likely the correlation is to assume a different range of values including whether it is not likely to be a zero correlation (statistical significance). This also might be followed by an examination of aspects of the study that might have an effect on the size of the association (e.g., restriction of range, inter-rater reliability being less than perfect).

Note that often a 'hard' criterion such as sales performance is not practically achievable in many jobs. And even 'hard' job performance criteria can have systematic biases, e.g., being given a geographical region that has historically poor sales.

Supervisor ratings are an alternative method of job assessment which are often collected (see the Criterion Problem Revisited in this chapter).

Sometimes predictive validation studies are run on a well-established test being actively used by an organization. Under these circumstances, the organization's selection process may have removed low scorers based on the results of the assessment, and it is therefore not possible to later assess how these low scorers on the test or assessment might subsequently perform in the job. This restriction of range will reduce the size of the association seen between the assessment and the job performance measure and consequently underestimate the usefulness of the test.

Concurrent – another type of criterion-related validity evidence. It is similar to a predictive validation design in that a predictor assessment is correlated with a criterion outcome of performance in the job. The difference is that there is not a time lag between the initial assessment and the independent evaluation of performance on the job (the assessment score and job performance measure are collected concurrently).

One advantage of a concurrent validation study is that users don't have to administer a test at time one and then wait until time two before examining the relationship between the test and job performance. If a relationship is found between the test scores and current levels of performance, then concurrent validation evidence provides support for the test to be used with job applicants to identify those who are more likely to perform better. For practical reasons, organizations rarely want to have a substantial delay before seeing if a test works for them.

As with a predictive design, a potential difficulty in running this type of study is the need for a sufficiently large sample of participants to make the interpretation of the association between the predictor and criteria statistically meaningful.

Another problem is poor performers (or indeed good performers) may have already left the organization or have been promoted (leading to potential restriction of range).

One common confusion is the use of benchmarking studies as a means to validate a test. Benchmarking is a useful exercise where, for example, the characteristics of top performers are identified. The objective is typically to identify what top performers have in common (e.g., which personality traits) so that future hires can be selected using this "top performer" scoring template.

The problem with this approach is that, while it tells us what top performers have in common, it fails to tell us what makes them different from average or poor performers. A benchmarking study is useful in identifying the characteristics that top performers have in common, but it does not tell us which characteristics are unique to top performers only. An associated problem is that it may just be a matter of luck that the top performers tend to be high on certain characteristics and not related to their superior performance. Such benchmarking studies used in isolation (without being used alongside a concurrent or predictive design and job analysis) carry particular dangers for organizations as they may lead to the organization using a spurious "scoring key" which is not associated with superior performance (lacks criterion-related validity). The result could not only be that the organization selects many poor performers, but it is likely to lay itself open to an increased risk of litigation if the assessment process is perceived as unfair.

Content – a type of validity evidence related to the appropriateness of the content of the assessment. It seems obvious that a typing test is a "valid" test for a typist job because the content of the test matches closely the content of the job. Giving a typing test to a CEO candidate might appear odd, however, because the content of the test does not seem appropriate given the content of a typical CEO position.

Unlike the types of criterion-related validity described above, a content validation study does not rely upon a statistical analysis. Rather, it uses a rationale approach to linking job content to test content. A job analysis study is required to identify and document the critical work behaviors and competencies tied to job success. Once identified, assessment tools that measure that same domain of content (i.e., tasks, behaviors, skills, knowledge) are identified. Job simulation exercises or situational judgment tests are often considered job relevant and content valid when the exercises or situations presented resemble the same as those found on the job.

Likewise, a job analysis may identify certain behaviors such as Team Working or Empowering Others to be critical to job success, and Wave competencies can be identified that are similar to the "behavioral domain" identified in the job analysis. In this way, the Wave dimensions can be mapped to a job for the purposes of

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predicting Person-Job Fit. The Wave competencies can also be mapped to client competency models to enable the use of the Wave Styles questionnaire to measure the client's own competencies.

One way to identify and document critical workplace competencies, behaviors and aptitudes is to use the Wave Job Profiler or the Wave Performance Culture Framework Cards. Job experts make ratings online or sort competency cards to specify which competencies are important. This semi-structured approach is a valuable addition to any job analysis study.

Content validity evidence by itself is sufficient to justify an assessment program even for high stakes situations like pre-employment selection and is an accepted validation strategy by regulatory commissions (i.e., Uniform Guidelines on Employee Selection Procedures published by Equal Employment Opportunity Commission of the US Government). However, it is but one type of validity evidence and we recommend the collection of empirical data using criterion-related validation studies in addition to content validation studies.

Construct Validity is a type of validity evidence that shows that a test or questionnaire measures the psychological construct that it purports to measure. It is important because it impacts how a test score is interpreted. If a questionnaire claims to measure extroversion, how do we know it actually measures extroversion and not emotional stability? If an assessment claims to measure extroversion but does not, then any interpretation of that score would be wrong and could cause harm to the respondent and to the organization.

An assessment instrument, its items, internal structure and design, and the responses test takers give all lead to scores to be interpreted as representations of underlying psychological constructs. Inferences made on these scores are based on the proposed psychological construct and its relationship with other constructs, both theoretically and empirically. In essence, all validity evidence contributes to an understanding of an assessment instrument's construct validity. Evidence of criterion-related and content validity are therefore subordinate to construct validity – all forms of validity contribute to construct validity. Construct validity is therefore a continuing scientific pursuit to build up a body of evidence about how an assessment instrument works rather than simply something that a test possesses or does not possess (see for example, Landy, 1985).

Wave Professional Styles and Validity

Wave Professional Styles questionnaires are unique in that validity was specifically examined early in the development phase to maximize their opportunity to demonstrate superior criterion-related validity when applied in the workplace. This was done by selecting the most valid items for inclusion in the questionnaires from a very large item and facet scale pool.

Saville Consulting run an extensive validation program in addition to the individual studies commissioned by our clients. Our program includes the co-validation of Wave Styles questionnaires with other personality assessments against a wide range of work criteria

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across mixed occupational groups. These and other studies provide evidence that supports the inferences made on Wave Styles reports and provide evidence to support the appropriate use of the Wave Professional Styles questionnaires.

We believe that validation should start by being clear on the inferences that are to be drawn from the assessment and using those to guide the strategy for collecting validation evidence. This helps create a well directed program that includes specifying who should be included in a study, what performance variables (criteria) should be collected, and which evaluation approaches and statistical methods are appropriate.

The modern conception of test validity has at its heart the notion that we are validating the inferences that are made from test scores. Therefore, the first step is to be clear about the nature of these inferences.

Inferences from Test or Assessment Scores

An inference from a test score or set of questionnaire scores can be general or local. For example, "High scorers on this scale will demonstrate more creativity" is a general inference. A criterion-related validation design might be an appropriate starting point to examine the validity of this inference. A statistically significant positive correlation with a moderate effect size between the scale score and a measure of creativity would provide clear evidence that supports this general inference. Such evidence provides us with confidence that the scale is meaningful and the inference or interpretation we then draw about one person's creativity using the scale score is appropriate. General inferences such as these can be explicitly stated as hypotheses and tested empirically.

If a test or assessment score is shown to be a valid measure of a psychological construct like creativity, and if we learn from a job analysis study that a construct like creativity is important to successful job performance, then we may want to use the test or assessment score to identify which people are more creative than others. In other words, if creativity is an important component of a job (content domain of a job), then we can use a test to measure that specific job component.

When we explicitly state the relationship between the assessment tools and the components of a job, this is referred to as evidence of **job component validity** and can allow for an assessment of synthetic validity. The inferences made from the test are interpreted in light of those specific job components. **Synthetic validity** is a logical process of inferring validity on the basis of the relationships between components of a job and tests of the attributes that are needed to perform the job components. Note in synthetic validity the relationships between the job components and the tests are typically established in one validation study of workers, and then a job analysis only is conducted on the new job to identify job components. The similarity or equivalence between the new job analysis and the previous validation study allows the validity to be estimated in the new job. It is synthetic because the validity has not been directly calculated based on a criterion validation study on the new job.

If all of the scores (predictors) in a questionnaire correlate positively with the performance criterion each is designed to measure, we refer to this as **saturated validity**. Saturated validity is where all the predictor scales of a questionnaire correlate with all the *a priori*

hypothesized criteria. Clearly, there is the issue of levels of saturation/levels of validity on each scale of a model – but if *all* the scales in an assessment show meaningful correlations with *a priori* specified independently assessed criteria (i.e. from independent raters of performance) we refer to this as saturation of the model or assessment. Another related issue is the overall level of validity against each criterion.

Thus far we have discussed general inferences that apply across a group of test takers. With any probabilistic approach such as personnel selection, no inference or decision is perfectly accurate. However, across a large group of test takers, valid scores will improve the accuracy of the inferences overall compared to the accuracy of inferences when the valid test is not used. Again, the test may not be perfect, but may nevertheless add significant value and productivity benefits to an organization compared to not using the test or assessment.

Eventually every test user uses a test or assessment score to make inferences and important decisions about an individual. Should this applicant be hired? Is this employee a good candidate for a leadership development program? Which position is this candidate best suited for? Which competencies should a person develop to improve performance at work? Is this person ready for a bigger job assignment? These are examples of individual local inferences made based at least partly on a test score.

It follows that, (a) if critical job components are identified and explicitly mapped to scores from an assessment tool, and (b) if the assessment tool has empirical evidence of saturated validity, then local inferences and test score interpretation will be more accurate as the validity of the assessment tool increases (MacIver et al., 2008).

This concept is especially important for multi-scale personality or styles questionnaires that require a user to interpret a profile of scores rather than a single test score. Making local inferences based on profile pattern interpretation can be a difficult and complex undertaking. Even though local inferences made using profile interpretation often may not be made explicitly regarding how the pattern of test scores relate to the local decision, it is still important to investigate the accuracy/validity of these local inferences and their impact on independent evaluations of work performance.

The bottom line – the accuracy and validity of both general and local inferences will improve when an assessment process has evidence of criterion-related validity across the full range of job components.

With regards to making inferences about behavioral competencies specifically, the Wave Professional Styles scales demonstrate both strong criterion-related validity across a range of behavioral competencies, and the range of behavioral competencies have been shown to be important to overall job proficiency. This increases the confidence that the inferences made using Wave Professional Styles, whether general or local, will be more accurate and valid than inferences made using methods or tools that have no validity evidence or tools that have lesser validity.

Inferences in Practice - Selection

In a practical sense, multi-scale assessment tools can contribute to personnel selection decisions in two ways:

1. using a subset of job-relevant scales, explicit prediction equations are created for each performance competency (based on empirical evidence and/or expert judgment) and applied to each job applicant in a consistent and objective manner (general inferences explicitly used to inform local inferences). An example of this is the Competency Potential scores provided in the Wave reports. A logical extension is the creation of one overall fit score for a particular job by creating a weighted composite of the assessment scores.

2. a trained/qualified professional reviews the pattern of scores on a profile chart and makes an interpretation of the pattern of scores relative to important job competencies which is then used to make inferences about the suitability of the applicant for the job (local inferences)

In both these instances, criterion-related validity (i.e., giving a valid estimation of likely performance levels) is critical. In the first instance, it is critical that the assessment tool provides criterion-related validity and that this has been cross-validated to ensure that the prediction equations will generalize to new situations, industries and workforces.

In the second case, it is the user who is doing the profile interpretation and integrating the results to make a local inference without local validation to explicitly guide the interpretation. Instead, users will need to rely on their understanding of the job and the evidence of test validity provided by the test publisher and other published research about the assessment tool.

We believe that test users benefit from the creation of a clear and straightforward approach that makes clear to the user the links between the predictors and criteria. The Wave Professional Styles scales are explicitly linked to specific behavioral competencies, thereby making the link between specific predictors and criteria clear and straightforward. Figure 20.1 shows the Saville Consulting Wave Aligned Criterion and Predictor Model. This aligned or matched model helps users to understand how each scale in the Wave Styles model (predictors) relates to the Wave model of behavioral competencies (performance criteria).

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Figure 20.1. The Saville Consulting Wave Aligned Criterion and Predictor Model
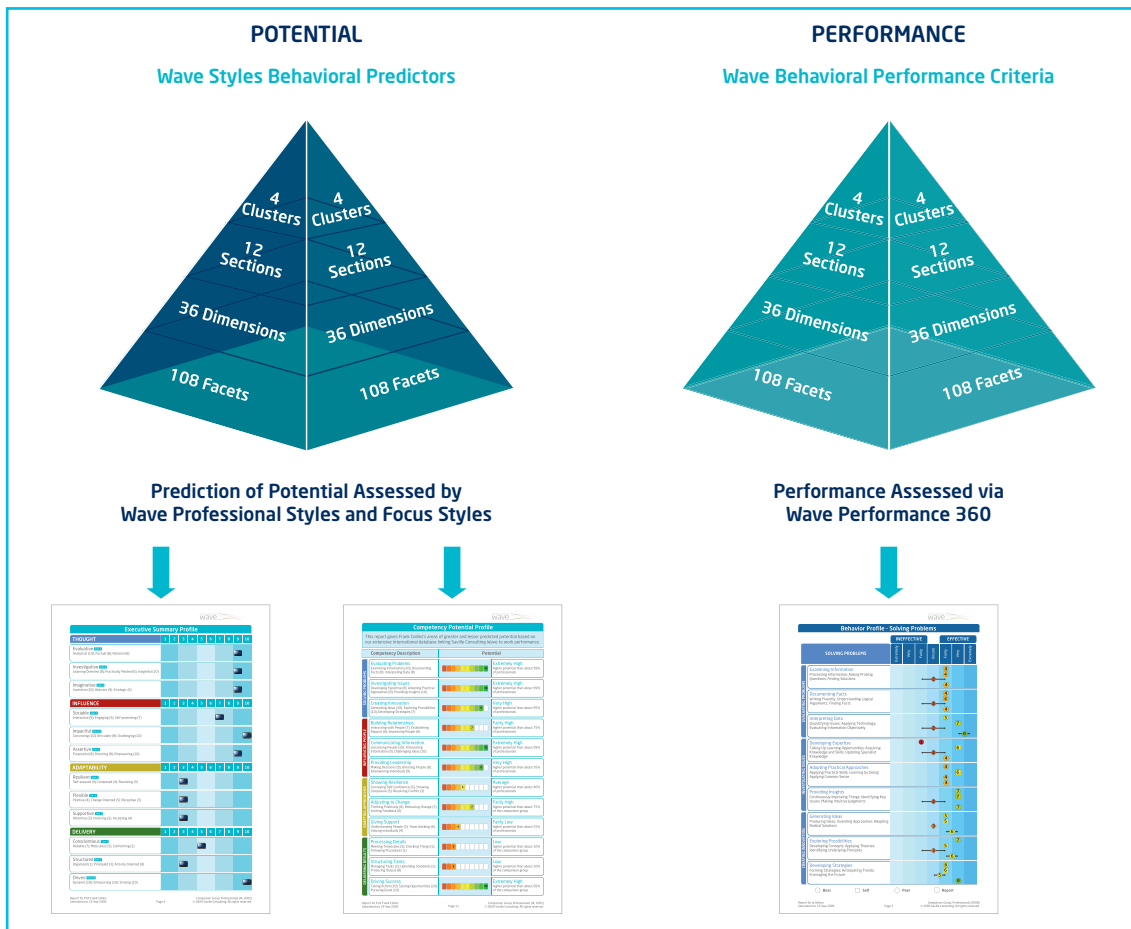
The Importance of Validity Data in Practice - Two Examples

Wave Professional Styles is designed to offer users a job relevant, saturated, validation centric model that clearly links Wave Styles scales (predictors) to Wave competencies (performance criteria). These are important features that provide practical advantages to end users allowing them to make better, more informed local or global inferences about people at work. The advantages of this approach are highlighted in the two examples that follow.

Personnel Selection

In personnel selection, how can validity data be used to ensure that a test is used appropriately?

1. **Job analysis** – a job analysis study provides the justification (i.e., content and job component validity) for using an assessment. The Saville Consulting Wave Job Profiler and Saville Consulting Wave Performance Culture Framework provide a simple process for job experts to identify critical job competencies and components using the Wave competency model. Once the critical competencies are known, it is an easy step to

select the appropriate/valid Wave Styles scales for making more accurate global or local inferences. Moreover, an index of Person-Job Fit can be calculated and reported based on the identification and assessment of the critical job components.

2. **Mapping to competency model** – detailed job descriptions already exist for many jobs so instead of conducting a job profiling study, the 147 components of the Saville Consulting criterion model (that includes aptitudes, behavioral and global outcomes) can be mapped to an organization's existing competency model. Once links between a client model and the Wave competency model are made, Wave Styles scales can be used for making selection decisions with reports using the organization's own competency model rather than the Wave competency model, which provides the underlying framework for the selection process.

3. **Local validation study** – without prior evidence of empirical validity, neither of the first two approaches is justified. Where no validation evidence exists, it is possible to conduct a local validation study. However, this is not feasible for many jobs or organizations due to an insufficient sample size which results in low statistical power and inconclusive results.

4. **Validity generalization** – this is generalizing the results from existing validation studies to new situations. This is especially useful when it is not feasible to conduct local validation studies. There are different ways to generalize validity, but three typical ways include: (a) transportability, (b) synthetic or job component validity, and (c) meta-analysis. Each is discussed below.

Perhaps a Sales Manager is interested in using an assessment tool to hire better sales staff. Unfortunately, the organization does not employ enough sales staff to conduct a local validation study. However, the test may have been previously validated for the selection of sales staff in a different organization. If the original validation study is sound, and its relevance to the new job is clear and sufficient, then the validity of the test can be "transported" from the previous job to the new situation. The Sales Manager now can use the assessment with confidence because of the transportability study. There are also some potential difficulties with this approach:

- Job analysis information must be available to compare the marker job with the target job. The job analyses must be sufficiently detailed to ensure the jobs are indeed compatible.

- The original study may be flawed. If so, the flaws are also transported to the target job.

- Unique local contextual conditions impact validity that are different in the new job, e.g., the applicant pool may have very different qualities.

- Jobs are dynamic and jobs that were once compatible may not stay that way.

An alternative approach is to rely on job component validity. This approach was introduced earlier in this chapter (see Inferences from Test or Assessment Scores). Basically, this approach starts with a job profiling study to identify critical job components. Once the critical components are known, an assessment is identified that purports to be a valid measure of that critical job component, and a score for the assessment is used to make inferences about that job component. If the relationship between the assessment and the

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job components is established, then the assessment can be generalized to other jobs having the same job components.

Wave Professional Styles has been designed to make this simpler to accomplish for users. Through the validation-centric process and the subsequent cross validation and criterion-related validation studies, the relationship is well-established between the Wave Professional Styles scales and the Wave behavioral competencies. The Wave Job Profiler and/or the Wave Performance Culture Framework cards make the identification of critical job components an easy and efficient undertaking. A user can move quickly from the job analysis study to organizing the assessment process, perhaps using Wave reports to match people to jobs or simply prioritizing the competency potential scores according to relevance or importance.

This also allows for approaches to estimate synthetic validity, i.e., the validity that should be expected from the target job given the job component validity. However, in addition to synthetic validity it is important to look for criterion-related validity with overall proficiency measures to verify that the assessment tools help drive superior performance at work (see the section that follows on the Criterion Problem Revisited comparing individual behavioral criteria versus overall performance criteria).

Meta-analysis is another common way to generalize validity. Meta-analysis requires the accumulation of findings from a number of validity studies to determine the best estimates of the predictor-criterion relationship for the kinds of work domains and settings included in the studies. Unlike transportability or job component validity, studies that rely on content validity approaches to understand the predictor-criterion relationship, meta-analyses rely exclusively on criterion-related validation studies. This approach has the benefit of reducing problems often associated with local validation studies. These include sampling error and other statistical artifacts. However, expert judgment is still required in interpreting and applying the results of meta-analytic studies. This includes closely examining the underlying assumptions, the tenability of the assumptions, how the artifacts may influence results, and finally the impact of potential moderator variables. As more and more empirical studies are conducted using Wave Professional Styles, this will enable a meta-analytic study to be conducted to summarize the accumulated findings from these individual studies. However, it should also be noted that large mixed occupational samples already conducted (such as the original validation as part of the standardization and Project Epsom), have certain advantages over meta-analyses as they can for example avoid file drawer effects that can inflate estimates of validity.

Development

Validity evidence provides similar benefits for those using Wave Professional Styles in a development context. Assessment for development often addresses two key things: (a) self-awareness – are the participants aware of their areas of strength and weakness? Do they have hidden potential or perhaps an Achilles' heel that may result in a career derailment if left unchecked?, and (b) job relevance - how do the participants' profiles relate to critical job requirements?

552 Various assessment tools have been created from the Wave Styles Aligned Model. Of course the Wave Styles questionnaires were developed to measure the Wave Styles scales, but the Wave competency model was also used to measure current job behaviors using the Wave Performance 360 questionnaire and the Wave Job Profiler was created to identify

critical job or role competencies. The application of all of these tools provides a powerful combination for development by enabling various comparisons to be made to identify "development gaps," for instance:

1. **By comparing the Wave Performance 360 Report with a Wave Job Profiler Report, you can see how a participant is performing on critical job components as part of a training needs analysis.**

2. **By comparing a Wave Professional Styles Expert Report with a Wave Job Profiler Report, you can see if a person has the competency potential (motive and talent) to move into a new role while identifying gaps where a coaching intervention may help smooth the transition process.**

3. **By comparing a Wave Professional Styles Expert Report with a Wave Performance 360 Report, you can compare competency potential with current performance on the competency for purposes of determining readiness to advance as part of a succession planning exercise, or to spot gaps between current performance and competency potential that could be due to lack of training or motivation to perform.**

Development professionals and executive coaches address these and related issues with a multitude of clients in their daily work. They often rely on their intuition and experience to gain insights into the individual and the challenges and opportunities that person faces. Competency-based tools to assess role requirements and work behaviors can add structure and rigor to this process. The Wave Professional Styles questionnaires can help to "explain" poor or outstanding work behaviors and enable users to gauge how easy it will be for them to develop a certain competency.

To illustrate this, take an example of a performance-potential gap analysis. According to the Wave model, a person who scores high on a Wave Styles dimension (e.g., Empowering) would be expected to receive high ratings from others in the Wave Performance 360 assessment on the matched Wave competency (e.g., Empowering Individuals), assuming the constructs are properly aligned in the model and their relationship has been empirically validated. A high score on the Empowering dimension indicates the person has indicated that they are both talented and motivated when it comes to empowering others, and this behavior is expected to be observed by others in the workplace – most likely their subordinates.

If the data from the Wave self-assessment and the Wave Performance 360 are aligned, then there is no great surprise, but if the results of the 360 indicate lower performance on Empowering Individuals than would be expected from the self-assessment, then this can be further examined. In this case the person appears to have the potential to be an effective performer based upon the information provided by Wave Professional Styles, but for some reason is not seen by others as performing up to their potential. A development intervention may help this person reach their full potential in this area, perhaps by clarifying roles and responsibilities, improving time management, gaining confidence in the ability of team members to take on additional responsibilities, etc. Note that the assessments did not solve the development issue, but it did draw attention to it so that appropriate inferences and actions could be taken. Validation evidence is important in this case because we expected to see a relationship between the Wave Professional Styles report assessment and the Wave Performance 360 report because the relationship between them has been validated.

Criterion-Centric Approaches to Validation

The starting point for the development of an assessment is a clear measure of the criterion it is designed to predict. Models and classifications of physical illness have been available for centuries. Models of mental disorders have also been available to practitioners of medicine, psychology and psychiatry for well over half a century (the Diagnostic and Statistical Manual of Mental Disorders or DSM for example was first published in 1952). The presence of such models has allowed for an evaluation of the efficacy of different diagnostic, screening and treatment protocols enabling a continuous process of improvement in these fields.

By contrast, assessment in the workplace has been more concerned about the characteristics and psychometric properties of tests and other predictors than the workplace criterion they attempt to measure (Landy, 2007). Many HR professionals and testing experts believed that a high degree of situational specificity existed requiring a local validation study as the only reliable way to examine the predictor-criterion relationship. In addition, organizations preferred to develop their own models of values and competencies (criterion models) to capture their unique character. The result has been a lack of interest in looking for the common threads across jobs and industries, geographies, and cultures.

The work of Hunter and Schmidt on meta-analysis in 1984 laid waste to situational specificity as the predominant working hypothesis in assessment by demonstrating that cognitive tests' validity generalize with overall measures of job performance across jobs. In more recent meta-analyses, moderators of cognitive validity have been identified, i.e., as job level or complexity increases, so does the validity of cognitive tests (Anderson and Salgado, 2002) against the backdrop of validity generalization. An important lesson to be drawn from research on cognitive abilities is that firstly it is important to be clear on how validity generalizes to establish a baseline understanding, and then secondly it is important to look at moderating variables to explain inconsistent results.

Unlike in the area of cognitive ability assessment, validity generalization of personality assessment is the exception rather than the rule, and local validation of the organization's own criteria remains the preferred approach. One reason for this has been the lack of consistent frameworks that classify and codify work competencies and criteria. Local studies do have their advantages, but they also have their drawbacks – most notably small sample sizes and a lack of statistical power. We believe that to progress we need to establish comprehensive behavioral criterion models that are linked to common measures of work effectiveness and outcomes that generalize across different jobs, industries and cultures. That is, we need to become criterion-centric rather than predictor-centric in our research.

Some advances have been made, however. Attempts have been made to group work criteria into meaningful classifications to allow for research to be conducted to evaluate the effectiveness of different measures in different criterion classifications (Campbell et al., 1993, Robertson and Kinder, 1993, Bartram, 2005, MacIver et al,. 2006, Hogan et al., 2007).

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The Criterion Problem Revisited

In the criterion domain, Saville Consulting Wave was designed to provide measures of work effectiveness against two types of criteria:

- Specific behavioral competencies (behavior effectiveness criteria).

- Overall performance effectiveness that includes: job proficiency, potential, and the application of expertise in the workplace (global performance criteria).

Which criteria matters more – general global performance measures or specific behavioral competencies and their subcomponents? That behavioral competencies link to personality and styles measures is not controversial and has been extensively reported elsewhere (Robertson & Kinder, 1993; Kurz & Bartram, 2002). Robertson, Callinan and Bartram (2003) stated that, "We define competencies as sets of behaviors that are instrumental in the delivery of desired results or outcomes." Competencies are important to success at work and as a result should show clear links to global measures of performance effectiveness.

In practice, many organizations define competencies/criteria through job analysis, but some also rely upon common sense methods for identifying job competencies. While these approaches often appear logical and job relevant, there is no guarantee they will show a positive correlation with overall performance measures. Consider these examples provided by Schultz (1998). Would you have second thoughts about evaluating tests for the following roles against the suggested criteria?

Job Role	Criteria
Toll collector	Accuracy of Making Change
Tax collector	Amount of Delinquent Taxes Collected

At first these criteria appear almost self-evident. Yet, years ago when the Port Authority of New York and New Jersey implemented "accuracy" as a selection criterion for toll collectors, the result was traffic being backed up for miles. Speed of making change was more important to overall job performance, even at the expense of some minor errors. Likewise, the best tax collectors often have very good rapport with taxpayers, and so have fewer delinquencies to collect.

We believe that a competency should be positively associated with improved overall performance and potential. That is, competencies/criterion models should be developed based on their relationship to global measures of performance and potential. The choice, then, is not between overall global effectiveness measures and specific behavioral measures, but rather modeling and researching links between these two types of competencies to better understand their relationship. That said, there may be some competencies that are important but that do not directly contribute to overall performance effectiveness. These may be competencies that impact job satisfaction, team cohesion, or corporate values – and these may be important criteria in their own right even though they may not underpin more effective individual job performance. Still these links to other important criteria should be empirically tested.

The aim of Wave Styles was to create assessments that have been designed to not only be the most effective indicators of individual behavioral effectiveness, but also be indicators that will generalize to forecast overall measures of effectiveness at work when scales are combined. In fact, the authors argue that the competency predictions should be built to maximize the forecasting of overall effectiveness first and their matched behavioral competencies second. For these reasons the criterion-related validation evidence in this chapter is presented using both types of criteria – overall performance effectiveness and individual behavioral competencies.

Magic Bullets in Validation

The statistical argument

A related issue to the foregoing is that validity may not come from one scale that is highly valid, but from many scales that each account for a unique bit of the variance in the criterion. However, validation studies are often conducted in an attempt to find a magic bullet, i.e., the most effective individual scale (or a composite of two or three scales) that accounts for the majority of the criterion variance. These approaches often suffer from statistical artifacts such as sampling effects where the highest correlation for one sample of participants will tend to regress towards the mean when cross validated using a new sample of participants. These dangers are amplified when a large number of scales are being considered without *a priori* hypotheses indicating how each scale is expected to relate to performance criteria.

A key drawback of this approach is that if many of the correlations with overall performance measures have small true effective sizes, then "statistical fishing" and *post hoc* analysis lead to Type II errors due to the lack of statistical power. So that a number of scales which have small correlations with criteria may not be included yet they could contribute to the overall prediction. Examining how a large number of individual scales correlates with performance is an exploratory approach which can lead to incorrect findings and confirmatory bias.

Rather than scanning many individual predictor correlations with the risk of making Type I and Type II errors, the approach to validation argued for here is to create predictions across the scales of the predictor assessments.

This is accomplished by creating one broad composite predictor score or job fit index using the relevant prioritized predictor scores. This overall composite fit index is correlated with overall job effectiveness to establish the validity (this would be done in addition to correlation individual behavioral prediction scores with individual behavioral criteria).

The philosophical argument

Assume the validity of a magic bullet assessment and the validity of a composite Person-Job Fit index are the same when validated against a measure of overall job effectiveness. Does it matter which approach is used? We believe the broader composite Person-Job Fit index is still superior. The reason for this is the following. The composite predictor score is comprised of multiple measures of different individual competencies while the magic

bullet measures a much more limited set of work behaviors. Having a wider array of competencies from which to draw may help to stabilize validity when the demands of the job are variable and prone to change rapidly, requiring workers to rely on multiple competencies to meet the demands of the job, particularly if these competencies, as we believe they should, show positive associations with overall performance.

Wave Professional Styles and Improved Validity

Wave Professional Styles is expected to have higher criterion-related validity than personality questionnaires developed using conventional approaches. Maximizing validity was central to the development strategy. While there are great advantages in terms of efficiency of the rate-rank format and in depth interpretation from the motive-talent concept, it is focusing on clear work related outcomes (see Morgeson et al (2007) which comments on this topic) in this instance in terms of behavioral competencies as well as overall effectiveness at work that is a central, if not the sole contributor, to this increase in criterion related validity.

A clear focus and model of what is to be predicted was the start point and then extensive item writing and review to create items underpinning effectiveness at work. This was followed by a selection of items from a large item pool creating the basis for improved validity. The fact that validation-centric item selection and competency potential equation building should subsequently lead to more accurate forecasting of work outcomes perhaps should not be surprising: the superiority of methods that have been built using the statistical relationship between predictor and outcome (so actuarial or mechanical methods) over methods that lack this information has previously been demonstrated (see Grove et al., 2000 for meta-analysis comparing actuarial and non actuarial prediction across different fields. Note. This finding holds true in fields with a clear history of theory and research).

Wave Professional Styles is a valid measure of important workplace behaviors and competencies. What may be more surprising is the improved validity for measuring overall job performance and effectiveness compared to traditional personality questionnaires. This is because, while the Wave Styles model was not designed to be structurally aligned with overall performance, its items were selected because they correlated well with measures of overall performance in addition to their *a priori* matched competency.

Some may argue that Wave Professional Styles shows higher validity coefficients because it uses its own aligned competency model, and that using a structurally aligned predictor-criterion inflates its validity compared to criteria that are structurally independent of the Wave Styles model. In the section that follows, we show results comparing Wave Professional Styles to the Great Eight performance competencies to show that Wave's improved criterion-related validity will generalize to an independently developed performance criterion model and is not an artifact of the aligned Wave predictor-criterion model. Results against overall effectiveness are of fundamental importance and are not structurally aligned in content to the Wave behavioral model. The cross validated results of overall effectiveness in mixed occupational groups then give an indication of the criterion related validity of Wave Professional Styles without the concern that the content alignment could be partially inflating these results.

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20.1 Validity Research

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20.2 Construct Validity

To understand the construct validity of Wave Professional Styles it is important to recognise that the construction of the assessment sought to maximise the forecasting of individual behavioral competencies as well as that of overall effectiveness using a priori combinations of Wave dimensions.

In regarding behavioral competencies as behaviors that underpin effective performance at work, it is logical that when forecasting competencies relevant to a job, the sum of those competency forecasts should correlate with overall effectiveness.

As a result construct validity is presented in this section of the chapter which relates Wave Styles measures to a priori forecasts of the Great Eight competencies from other tools. The criterion-related validity section of this chapter provides further evidence of the relationship with ratings of competencies and Wave Styles dimensions. Ratings of overall effectiveness are also forecast by Wave Styles from a priori composites of Wave dimensions in the criterion-related validity section. The authors regard this criterion-related validation evidence as a critical component in understanding the construct validity of Wave Professional Styles in addition to the information provided in this construct validity section.

Construct Validity: Wave Styles and other Personality Assessments

A large-scale co-validation study ("Project Epsom") was carried out as part of the Wave Research and Development program. This study was designed to establish and compare the validity of a number of commonly used personality measures. Participants (N=308) from a diverse range of job sectors completed an assortment of personality assessments. This section looks at the construct validity of Wave Professional Styles with these other personality assessments, by aligning Wave Professional Styles and other personality assessments on the Great Eight competencies. For further information on the Epsom sample refer to Appendix C of this handbook.

Professional Styles Great Eight Factor Analysis

The Great Eight

The 'Great Eight' model is a criterion-centric model of work performance developed by Kurz and Bartram (Kurz and Bartram, 2002). The 'Great Eight' are eight broad competency factors which reflect psychological constructs relating to effective work performance. The eight competencies are:

- Analyzing & Interpreting
- Creating & Conceptualizing
- Interacting & Presenting
- Leading & Deciding
- Supporting & Cooperating
- Adapting & Coping
- Organizing & Executing
- Enterprising & Performing

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Different multi-trait questionnaires can be mapped to these competencies. The original mapping to the OPQ questionnaires can be found in Bartram (2005).

The table entitled 'Conceptual Mapping of the 'Great Eight' Competencies against Wave Professional Styles' and other assessments' scales, in the Criterion-related validity section of this chapter, shows the a priori conceptual mapping of the personality assessments to the 'Great Eight' work performance competencies by subject matter experts (Saville, 2008).

Construct Validity: Factor Analysis

An eight factor solution was specified to investigate how the Wave Professional Styles dimension related to the Great Eight competencies. Despite Wave Professional Styles being a self-report assessment, it is criterion centric - and therefore it is of interest to see how the structure of its scales align to an external criterion model.

The 36 Wave dimension scales were entered into a Principal Components Factor Analysis followed by Varimax rotation. Eight factors were specified. These eight factors accounted for 60.1% of the variance. The Rotated Component Matrix (see Table 20.1 on the next page) shows the dimensions loading on to the eight factors. We have postulated names for these eight factors, aligning to the 'Great Eight' competencies. It can be seen from the dimensions loading on these factors that the factors specified in the Factor Analysis are relatively well aligned to the constructs measured by the 'Great Eight.'

Table 20.1 Wave Professional Styles' 36 dimensions Factor Analysis.

	ROTATED COMPONENT MATRIX							
	Component							
	1	2	3	4	5	6	7	8
Postulated Names for Interpretation of the Factors:	Enterprising & Performing	Leading & Deciding	Organizing & Executing	Interacting & Presenting	Supporting & Cooperating	Adapting & Coping	Creating & Conceptualizing	Analyzing & Interpreting
WAVE DIMENSIONS								
Analytical							.51	**.49**
Factual							**.77**	
Rational								**.78**
Learning Oriented							**.77**	
Practically Minded								**.56**
Insightful	.49							
Inventive	.47							
Abstract							.52	
Strategic	**.71**							
Interactive				**.72**				
Engaging				**.77**				
Self-promoting				.50				
Convincing		**.78**						
Articulate				**.64**				
Challenging		**.72**						
Purposeful		**.60**				.44		
Directing		**.58**						
Empowering					.45			
Self-assured	**.63**							
Composed						**.72**		
Resolving					**.58**			
Positive						.44		
Change Oriented						**.65**		
Receptive								
Attentive					**.76**			
Involving					**.70**			
Accepting					**.65**			
Reliable			**.77**					
Meticulous			**.73**					
Conforming			.51					
Organized			**.80**					
Principled			**.48**					
Activity Oriented						.53		
Dynamic	**.64**							
Enterprising	**.57**							
Striving	**.70**							

Loadings >.55 in bold | Loadings <.40 omitted. N=308.

'Great Eight' Level Analyses

Analysis was conducted, based firstly on Wave Styles dimensions and subsequently on Wave Competency Potential dimensions. Each time, two levels of analysis were conducted from 'Great Eight' conceptual mapping: analysis at the 'Great Eight' overall competency prediction score level and analysis at the dimension level.

At the first level, personality assessments were compared on the 'Great Eight' competencies and composite 'Great Eight' predictor scales were created. The first of the three personality scales for each competency was double weighted in line with Bartram (2005). These three predictor scales were then aggregated with unit weights to provide an overall score from each personality assessment for each competency. 'Great Eight' scores for Wave Competency Potential and Professional Styles dimensions were then correlated with 'Great Eight' scores for the Saville PP, OPQ, NEO-PI-R, Hogan Personality Inventory (HICS) and 16PF5. It was hypothesized that 'Great Eight' competencies developed using Wave Styles would demonstrate strong positive correlations (>.45) with their counterparts from other personality assessments (average on-diagonal). Furthermore, it was hypothesized that the average of these corresponding (on-diagonal) correlations between Wave Styles and each comparative instrument would be above .45 and greater than the average of the other, non-corresponding (off-diagonal), 'Great Eight' competencies correlations (providing evidence to support construct separation and discriminant validity of Wave Professional Styles).

Wave Styles

Table 20.2 illustrates a summary of correlations between Wave Professional Styles' 'Great Eight' and Saville PP's, the OPQ's, the NEO-PI-R's, the HPI (HICS)'s and the 16PF5's 'Great Eights'.

Table 20.2 Construct Alignment: Correlations between Wave Professional Styles' 'Great Eight' and the 'Great Eights' of other instruments (N=308)

Great Eight Competency	Saville PP	OPQ	NEO	HPI	16PF
Analyzing & Interpreting	.74	.60	.43	.45	.33
Creating & Conceptualizing	.78	.73	.29	.43	.49
Interacting & Presenting	.77	.70	.49	.58	.69
Leading & Deciding	.76	.72	.67	.68	.50
Supporting & Cooperating	.69	.70	.46	.40	.54
Adapting & Coping	.55	.54	.60	.51	.49
Organizing & Executing	.76	.61	.55	.22	.51
Enterprising & Performing	.74	.61	.49	.48	.28
Average on-diagonal	**.73**	**.62**	**.50**	**.47**	**.48**
Median	*.75*	*.66*	*.49*	*.47*	*.50*
Min	*.55*	*.54*	*.29*	*.22*	*.28*
Max	*.78*	*.73*	*.67*	*.68*	*.69*
Average off-diagonal	**.20**	**.17**	**.16**	**.17**	**.16**
Highest other	**.54**	**.33**	**.44**	**.47**	**.51**
Name of highest other	Wave 'Enterprising & Performing' and SPP 'Leading & Deciding'	Wave 'Creating & Conceptualizing' and OPQ 'Leading & Deciding'	Wave 'Interacting & Presenting' and NEO 'Leading & Deciding'	Wave 'Interacting & Presenting' and HPI 'Leading & Deciding'	Wave 'Organizing & Executing' and 16PF 'Enterprising & Performing'

Strong correlations were found between Wave Professional Styles' and the Saville PP, OPQ, NEO-PI-R, HPI(HICS) and 16PF5's corresponding 'Great Eight' competency predictions; the averages of these correlations were .73, .65, .50, .47 and .48 respectively, far exceeding average off-diagonal correlations of .20, .17, .16, .17 and .16 respectively. Results provide strong evidence to support the construct validity of Wave Styles and demonstrate clear convergent and discriminant validity between the Great Eight constructs.

Wave Competency Potentials

Table 20.3 displays a summary of correlations between Wave Competency Potentials' 'Great Eight' and Saville PP's, the OPQ's, the NEO-PI-R's, the HPI (HICS)'s and the 16PF5's 'Great Eights'.

Table 20.3 Construct Alignment: Correlations between Wave Competency Potentials' 'Great Eight' and the 'Great Eights' of other multi-trait instruments (N=308)

Great Eight Competency	Saville PP	OPQ	NEO	HPI	16PF
Analyzing & Interpreting	.73	.58	.42	.43	.37
Creating & Conceptualizing	.76	.69	.28	.45	.49
Interacting & Presenting	.75	.67	.46	.57	.68
Leading & Deciding	.76	.69	.69	.68	.50
Supporting & Cooperating	.69	.69	.49	.41	.57
Adapting & Coping	.51	.46	.62	.46	.49
Organizing & Executing	.76	.65	.58	.23	.49
Enterprising & Performing	.71	.55	.52	.54	.32
Average on-diagonal	*.71*	*.62*	*.51*	*.47*	*.49*
Median	.74	.66	.51	.46	.49
Min	.51	.46	.28	.23	.32
Max	.76	.69	.69	.68	.68
Average off-diagonal	*.23*	*.20*	*.18*	*.20*	*.18*
Highest other	.69	.51	.57	.58	.51
Name of highest other	Wave 'Enterprising & Performing' and SPP 'Leading & Deciding'	Wave 'Enterprising & Performing' and OPQ 'Leading & Deciding'	Wave 'Interacting & Presenting' and NEO 'Leading & Deciding'	Wave 'Interacting & Presenting' and HPI 'Leading & Deciding'	Wave 'Organizing & Executing' and 16PF 'Enterprising & Performing'

Again, as expected, strong correlations were found between Wave Competency Potentials' and the Saville PP, OPQ, NEO-PI-R, HPI(HICS) and 16PF5's corresponding 'Great Eight' competencies; the averages of these correlations were .71, .62, .51, .47 and .49 respectively, far exceeding average off-diagonal correlations of .23, .20, .18, .20 and .18 respectively. Results provide strong evidence to support the construct validity of Wave Competency Potentials and demonstrate clear convergent and discriminant validity between the Great Eight constructs.

Summary

The 'Great Eights' of both Wave Competency Potentials and Wave Professional Styles correlated with their comparative instrumental counterparts, the average of these correlations (average on-diagonals) exceeding the .45 criteria for all instruments. Wave Styles' 'Great Eights' correlated most strongly with their respective 'Great Eights' in the Saville PP and the OPQ. Given that Wave Styles, the Saville PP and the OPQ are those instruments closest aligned to the 'Great Eight' model, this is unsurprising. Furthermore, off-diagonal correlations exceeded the average on-diagonal only in cases where 'Leading & Deciding' and 'Enterprising & Performing' of the non-Wave correlates were involved, suggesting a specific area of misalignment for those instruments (i.e., the NEO-PI-R, HPI(HICS) and 16PF5) to these particular competencies in the 'Great Eight' model and mapping. These higher off-diagonal correlations did not exist in correlations with the Saville PP and OPQ 'Great Eights', demonstrating further the alignment of Wave Styles, the Saville PP and the OPQ to the 'Great Eight' model.

Dimension Level Analysis

As a further assessment of Wave Styles' construct validity the dimensions underpinning the Wave Styles' 'Great Eights' were correlated with the scales underpinning the Great Eight mapping in other instruments. It was hypothesized that the composites of each 'Great Eight' would demonstrate a strong average on-diagonal correlation, within their 3x3 block (>.45). For example, the extract below displays how for Wave Competency Potentials, the average on-diagonal correlation would be the average of the correlations between Examining Information and the OPQ32i's Evaluative, Exploring Possibilities and the OPQ32i's Conceptual and Interpreting Data and the OPQ32i's Data Rational and would be hypothesized to be above .45. Similarly, for Wave Styles, the average on-diagonal correlations would be the average of the correlations between Analytical and the OPQ32i's Evaluative, Abstract and the OPQ32i's Conceptual, Rational and the OPQ32i's Data Rational and would be hypothesized to be above .45.

Figure 20.2 Extract of Conceptual Mapping of the 'Great Eight' Competencies against Wave Professional Styles' and other assessments' scales.

Great 8 Criteria	Wave Competency Potential (CP) Dimensions	Wave Professional Styles (S) Dimensions	Wave Focus Styles (S) Facets	Saville PP	OPQ32i
Analyzing & Interpreting	• Examining Information • Exploring Possibilities • Interpreting Data	• Analytical • Abstract • Rational	• Information Analysis • Conceptual • Data Oriented	• Analytical • Theoretical • Data-Driven	• Evaluative • Conceptual • Data Rational
Creating & Conceptualizing	• Generating Ideas • Developing Strategies • Providing Insights	• Inventive • Strategic • Insightful	• Creative • Strategic • Focused on Improving Things	• Creative • Unconventional • Independent	• Innovative • Conventional (-) • Independent Minded

To aid understanding, the below diagram depicts the 3 x 3 blocks of OPQs vs Wave Styles' 'Analyzing & Interpreting' and 'Creating & Conceptualizing', with the on-diagonals highlighted in dark blue and the off-diagonals with grey blue. It would be expected that the off-diagonal correlation within the 3 x 3 block (the average of those grey blue cells within a 3 x 3 block) would appear slightly weaker, but still relatively strong, compared to the average of the correlations off the diagonal of the full matrix; all eight 3 x 3 blocks (24 x 24 block). The average off-diagonal correlation of the full matrix excludes all correlations within each 3 x 3 block, removing 72 correlations from the 24 x 24 matrix. The off-diagonal correlations of the full matrix are depicted in the below diagram as clear cells.

Figure 20.3 Diagram illustrating on and off-diagonal correlations in the 24 x 24 matrix
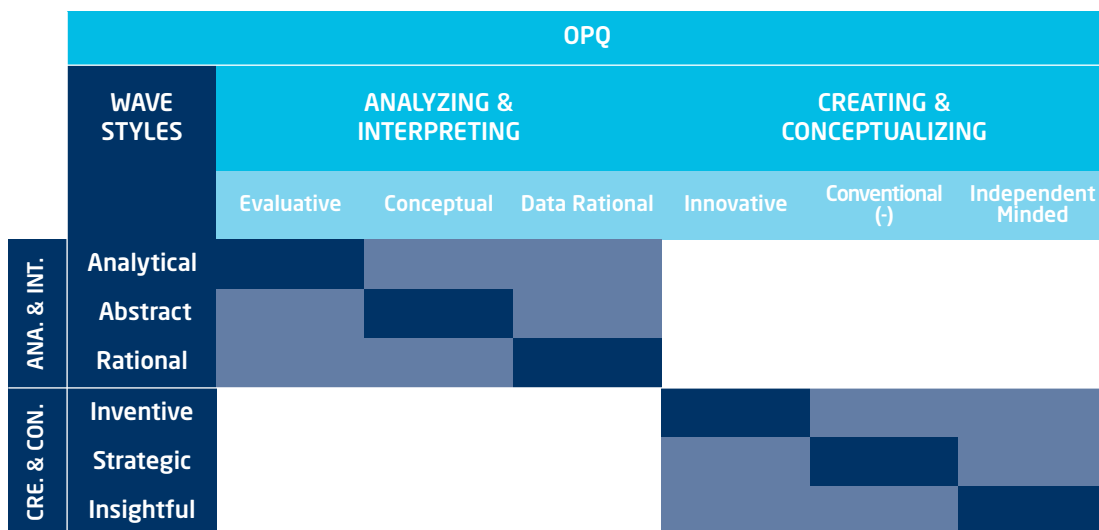
In summary, it was expected that:

- ■ The average of the on-diagonal correlations would exceed .45 and be higher than the average of the off-diagonal correlations within each 3 x 3 block

- ■ The average of the off-diagonal correlations within each 3 x 3 block would be slightly weaker than the average of the on-diagonal correlations, but stronger than the average of the off-diagonal correlations within the full 24 x 24 matrix

- ☐ The average of the off-diagonal correlations within the full 24 x 24 matrix would be lower than the average of the off-diagonal correlations within each 3 x 3 block

Again, analysis was conducted firstly based on Wave Styles scales and then on Competency Potentials. Worthy of consideration is the fact that it is notoriously difficult to align more narrow detailed constructs (as compared to those at the higher order level of abstraction, for instance, the Great Eight competencies). As a result it was expected that the more detailed dimensions would not show the same degree of convergence as the higher order Great Eight competency prediction scores.

Wave Styles

Table 20.4 illustrates a summary of correlations between Wave Styles dimensions underpinning the Wave Styles' 'Great Eight' and those of the Saville PP, OPQ, NEO-PI-R, HPI (HICS) and 16PF5.

Table 20.4 Summary of correlations between Wave Styles dimensions underpinning the Wave Styles' 'Great Eight' and those of other instruments (N=308)

Wave Competency Potentials	Saville PP	OPQ	NEO	HPI	16PF
Analyzing & Interpreting					
Average on-diagonal (3x3)	.62	.55	.28	.21	.25
Average off-diagonal (3x3)	.32	.24	.15	.22	.15
Creating & Conceptualizing					
Average on-diagonal (3x3)	.46	.43	.17	.19	.22
Average off-diagonal (3x3)	.36	.29	.11	.22	.24
Interacting & Presenting					
Average on-diagonal (3x3)	.64	.60	.32	.38	.47
Average off-diagonal (3x3)	.40	.35	.30	.37	.36
Leading & Deciding					
Average on-diagonal (3x3)	.54	.51	.33	.31	.34
Average off-diagonal (3x3)	.24	.21	.27	.26	.23
Supporting & Cooperating					
Average on-diagonal (3x3)	.57	.50	.24	.22	.35
Average off-diagonal (3x3)	.27	.33	.28	.18	.26
Adapting & Coping					
Average on-diagonal (3x3)	.39	.33	.39	.29	.33
Average off-diagonal (3x3)	.28	.28	.38	.25	.25
Organizing & Executing					
Average on-diagonal (3x3)	.39	.36	.25	.12	.34
Average off-diagonal (3x3)	.33	.29	.31	.28	.31
Enterprising & Performing					
Average on-diagonal (3x3)	.65	.55	.35	.18	.12
Average off-diagonal (3x3)	.21	.15	.22	.24	.16
AVERAGE OFF-DIAGONAL (24X24)	**.08**	**.05**	**.06**	**.07**	**.06**

Wave Competencies

Table 20.5 illustrates a summary of correlations between Wave Competency Potential dimensions underpinning the Wave Competency Potentials' 'Great Eight' and those of the Saville PP, OPQ, NEO-PI-R, HPI(HICS) and 16PF5.

Table 20.5 Summary of correlations between Wave Competency Potential dimensions underpinning the Wave Competency Potentials' 'Great Eight' and those of other instruments (N=308)

Wave Competency Potentials	Saville PP	OPQ	NEO	HPI	16PF
Analyzing & Interpreting					
Average on-diagonal (3x3)	.64	.54	.30	.21	.28
Average off-diagonal (3x3)	.36	.25	.18	.24	.17
Creating & Conceptualizing					
Average on-diagonal (3x3)	.49	.45	.17	.21	.25
Average off-diagonal (3x3)	.39	.32	.13	.24	.27
Interacting & Presenting					
Average on-diagonal (3x3)	.62	.58	.34	.23	.48
Average off-diagonal (3x3)	.46	.39	.32	.25	.39
Leading & Deciding					
Average on-diagonal (3x3)	.52	.47	.33	.33	.37
Average off-diagonal (3x3)	.27	.23	.32	.29	.25
Supporting & Cooperating					
Average on-diagonal (3x3)	.56	.53	.28	.24	.39
Average off-diagonal (3x3)	.31	.33	.31	.20	.30
Adapting & Coping					
Average on-diagonal (3x3)	.37	.30	.43	.27	.35
Average off-diagonal (3x3)	.27	.24	.41	.25	.26
Organizing & Executing					
Average on-diagonal (3x3)	.42	.41	.29	.13	.35
Average off-diagonal (3x3)	.33	.31	.34	.29	.33
Enterprising & Performing					
Average on-diagonal (3x3)	.62	.50	.44	.24	.10
Average off-diagonal (3x3)	.23	.17	.26	.28	.23
AVERAGE OFF-DIAGONAL (24X24)	**.10**	**.06**	**.07**	**.09**	**.08**

Tables 20.4 and 20.5 demonstrate that the average off-diagonal correlations for whole blocks (24x24) were indeed all lower than both all average off-diagonal correlations, within

their 3 x 3 blocks and all average on-diagonal correlations, within their 3 x 3 blocks. In the majority of cases involving the NEO-PI-R, HPI(HICS) and 16PF5, the average of correlations on the diagonal of the 3x3 block did not meet the >.45 criteria. This might be explained by a lack of alignment to the 'Great Eight' model of these three instruments as well as, in the case of the NEO-PI-R and 16PF5, a focus on more generic measurement of personality rather than a specific focus on an occupational setting. In addition, lower fidelity in terms of scale breadth and number, especially in the case of the 16PF5, with only 16 scales, is likely to result in lower than expected correlations when analysed at the individual scale level. Expected patterns of correlations were observed in nearly all cases where the dimensions underpinning Wave Styles 'Great Eight' were correlated with those of the Saville PP and OPQ, with the exceptions of 'Adapting & Coping' and 'Organizing & Executing', where the average of the corresponding scales' correlations fell just short of the >.45 criteria.

In a number of cases the average of the on-diagonal correlations within a 3 x 3 block was not higher than the average off-diagonal correlations, again within the 3 x 3 block. These are examples of cases where scales underlying higher order constructs do not necessarily align to each other but, when combined, do demonstrate convergence in terms of construct validity of that higher order construct. For example, Wave Competency Potentials' 'Conveying Self Confidence' and the OPQ's 'Relaxed', although both mapped onto 'Adapting & Coping', are clearly semantically quite far apart as constructs when analysed at the dimension level. However, these cases demonstrated reasonable averages of correlations off the diagonal, indicating that when aggregated, they are all part of the similar and closely related higher order construct. This, along with the analyses at the 'Great Eight' competency level (8x8) previously discussed, demonstrates strong support for the construct validity of both the Wave Competency Potentials and Professional Styles dimensions.

Summary

The composites of Wave Styles' 'Great Eight' competencies generally correlated as expected with those of other instruments' 'Great Eights'. Expected patterns of correlations were more regularly observed when scales underpinning the Wave Styles' 'Great Eight' were correlated with those underpinning the Saville PP's and the OPQ's 'Great Eights', rather than those of other instruments, probably due to greater alignment by Wave Styles, the Saville PP and the OPQ to the 'Great Eight' model, along with a stronger focus on the occupational setting and also greater fidelity in terms of scale breadth.

Non Great Eight Analyses

Wave Competency Potential and Professional Styles dimensions that did not directly align with the 'Great Eight' model and, therefore, were not included in preceding analysis, were conceptually mapped against the individual dimensions of the Saville PP, the OPQ, the NEO, the HPI and the 16PF by two independent subject matter experts. Analysis was based upon final mapping, determined by the level of agreement between experts, displayed in Table 20.6. Correlations are displayed under each mapped dimension, that against the Wave Styles scale first, followed by that against the Wave competency potential, in brackets.

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Table 20.6 Conceptual mapping and correlations of Wave Styles and Competency Potential dimensions with dimensions of other instruments

Wave Styles (Competency Potential) / Other Instrument	Saville PP	OPQ32i	NEO	HPI	16PF
Factual (Documenting Facts)					
Learning Oriented (Developing Expertise)	Open to learning .55 (.57)			Reading .45 (.38)	Reasoning .20 (.22)
Practically Minded (Adopting Practical Approaches)					
Convincing (Convincing People)	Socially assured .15 (.21)	Persuasive .43 (.42)	Assertiveness .47 (.61)		Social boldness .29 (.40)
Challenging (Challenging Ideas)	Direct .60 (.57)	Outspoken .56 (.52)	Angry hostility .34 (.29)		
Resolving (Resolving Conflict)					
Change Oriented (Embracing Change)	Adaptive .16 (.20) Novelty seeking .40 (.40)				
Receptive (Inviting Feedback)					
Accepting (Valuing Individuals)	Accepting .61 (.51) Considerate .49 (.61)	Caring .50 (.62) Trusting .54 (.48)	Trust .56 (.48)	Trusting .40 (.34) Empathy .39 (.34)	
Conforming (Following Procedures)	Procedural .75 (.78)	Rule following .75 (.75)			Rule consciousness .47 (.51)
Organized (Managing Tasks)	Organised .73 (.69)	Detail conscious .61 (.52) Conscientious .54 (.46)	Order .63 (.59)		Perfectionism .61 (.57)
Principled (Upholding Standards)					

Wave Competency Potential dimensions, 'Documenting Facts', 'Adopting Practical Approaches', 'Resolving Conflict', 'Inviting Feedback' and 'Upholding Standards', along with corresponding Wave Professional Styles dimensions 'Factual', 'Practically Minded', 'Resolving', 'Receptive' and 'Principled' did not map onto any other instruments' scales, suggesting five constructs relatively unique to Wave. No analyses were conducted on these scales.

Correlational analysis revealed an average correlation for expected, mapped relationships between the dimensions of Wave and other instruments of .42, for both Competency Potential and Professional Styles dimensions, and an average correlation for unmapped relationships, not hypothesized, between the dimensions of Wave and other instruments of .15 for Competency Potentials and .13 for Professional Styles. The results of these analyses provide further clear evidence of construct validity amongst those variables mapped.

To further understand the construct validity of Wave Professional Styles, its constructs were correlated with corresponding constructs of work effectiveness as measured by self-ratings on Performance 360. Table 20.7 displays Wave Professional Styles dimensions and matched Performance 360 behavior dimensions with correlations of the former against self-ratings of the latter, the highest other non-matched Performance 360 behavior dimension and the average of all non-matched correlations.

Table 20.7 Wave Professional Styles Dimensions with aligned and non-aligned (highest other) Performance 360 Behavior Dimension self-ratings from Performance Culture Framework (N=308)

Wave Professional Styles Dimension	Mapped 360 Self Report	r	Highest Other (r)	Average r with Unmapped
Analytical	Examining Information	.25	Interpreting Data (.34)	.07
Factual	Documenting Facts	.37	Challenging Ideas (.18)	.01
Rational	Interpreting Data	.38	Following Procedures (.23)	.03
Learning Oriented	Developing Expertise	.30	Documenting Facts (.18)	.03
Practically Minded	Adopting Radical Approaches	.29	Checking Things (.17)	.02
Insightful	Providing Insights	.25	Taking Action (.23)	.05
Inventive	Generating Ideas	.54	Developing Strategies (.36)	.03
Abstract	Exploring Possibilities	.46	Developing Strategies (.35)	.06
Strategic	Developing Strategies	.41	Taking Action (.32)	.07
Interactive	Interacting with People	.44	Establishing Rapport (.39)	.06
Engaging	Establishing Rapport	.53	Interacting with People (.50)	.12
Self-Promoting	Impressing People	.37	Conveying Self Confidence (.26)	.01
Convincing	Convincing People	.36	Challenging Ideas (.42)	.06
Articulate	Articulating Information	.62	Conveying Self Confidence (.39)	.14
Challenging	Challenging Ideas	.39	Generating Ideas (.23)	-.03
Purposeful	Making Decisions	.41	Challenging Ideas (.39)	.10
Directing	Directing People	.54	Challenging Ideas (.36)	.11
Empowering	Empowering Individuals	.46	Generating Ideas (.39)	.14
Self-assured	Conveying Self Confidence	.45	Thinking Positively (.39)	.06
Composed	Showing Composure	.34	Articulating Information (.30)	.06
Resolving	Resolving Conflicts	.48	Convincing People (.33)	.08
Positive	Thinking Positively	.56	Showing Composure (.32).	.07
Change Oriented	Embracing Change	.46	Showing Composure (.25)	.06
Receptive	Inviting Feedback	.35	Developing Expertise (.16)	.03
Attentive	Understanding People	.50	Establishing Rapport (.36)	.02
Involving	Team Working	.42	Valuing Individuals (.42)	.04
Accepting	Valuing Individuals	.46	Understanding People (.30)	.02
Reliable	Meeting Timescales	.53	Managing Tasks (.43)	.08
Meticulous	Checking Things	.50	Following Procedures (.43)	.05
Conforming	Following Procedures	.62	Checking Things (.33)	-.05
Organised	Managing Tasks	.48	Meeting Timescales (.40)	.03
Principled	Upholding Standards	.36	Following Procedures (.28)	.03
Activity Oriented	Producing Output	.42	Meeting Timescales (.21)	.00
Dynamic	Taking Action	.43	Generating Ideas (.32)	.09
Enterprising	Seizing Opportunities	.59	Pursuing Goals (.38)	.10
Striving	Pursuing Goals	.47	Seizing Opportunities (.33)	.11
Mean		.44		.06
Median		.45		.06
Min		.25		-.05
Max		.62		.14

Table 20.7 demonstrates strong correlations between Wave Professional Styles dimensions and aligned Performance 360 self-ratings, averaging at .44 and ranging from .25 to .62. Average unmapped correlations were substantially lower, averaging at .06 and ranging from -.05 to .14. In most cases, the highest other (unmatched) correlation occurred with a 360 behavior dimension within the same section as the matched 360 behavior dimension, providing evidence for higher order factors within a hierarchical model. Moreover, in the majority of cases the highest other correlation was lower than that with the matched 360 behavior dimension, supporting the existence of lower level, separate constructs. The two dimensions where the highest other correlation is greater than that with their mapped 360 scales are Analytical and Convincing, with these correlating with the 360 scales Interpreting Data and Challenging Ideas respectively. Although these scales are from the same sections as the mapped 360 scale of the Styles dimension with which they correlate, both are, in comparison, strong behaviors that are likely to appear more noticeable and observable to both individuals themselves and observers. In the case of Analytical, Interpreting data is likely to be one of the stronger, more salient characteristics of the overarching section Evaluative. Similarly, for Convincing, Challenging Ideas is likely to appear more saliently as being representative of the overarching section Impactful. Overall, results provide clear evidence for the constructs within Wave Professional Styles.

To further understand the contribution made by lower level constructs to overall effectiveness, Performance 360 behavior dimension ratings were correlated against the Global effectiveness scales 'Applying Specialist Expertise', 'Accomplishing Objectives' and 'Demonstrating Potential'. Table 20.8 displays Wave Performance 360 behavior dimension ratings against Global (overall effectiveness) ratings. The Wave model is based on and built to underpin measures of overall effectiveness at work. With this in mind all the dimensions of Wave Performance 360 ratings from the Wave Performance Culture Framework were then hypothesized to correlate positively with one or more of the three Global effectiveness scales.

Table 20.8 Performance 360 Behavior Dimension ratings against Global (Overall Effectiveness) ratings of Applying Specialist Expertise, Accomplishing Objectives and Demonstrating Potential (N=308)

360 Behavior Ratings / Global Ratings	Applying Specialist Expertise	Accomplishing Objectives	Demonstrating Potential
Examining Information	.31	.35	.14
Documenting Facts	.30	.31	.21
Interpreting Data	.23	.20	.20
Developing Expertise	.41	.45	.39
Adopting Radical Approaches	.24	.26	.12
Providing Insights	.39	.45	.38
Generating Ideas	.24	.27	.30
Exploring Possibilities	.33	.37	.40
Developing Strategies	.26	.33	.46
Interacting with People	.16	.37	.21
Establishing Rapport	.17	.37	.09
Impressing People	.01	.23	.35
Convincing People	.22	.28	.18
Articulating Information	.32	.33	.31
Challenging Ideas	.32	.29	.25
Making Decisions	.27	.36	.20
Directing People	.34	.36	.31
Empowering Individuals	.33	.44	.22
Conveying Self Confidence	.25	.34	.42
Showing Composure	.25	.22	.15
Resolving Conflicts	.28	.35	.12
Thinking Positively	.22	.31	.19
Embracing Change	.30	.35	.36
Inviting Feedback	.31	.35	.35
Understanding People	.25	.37	.06
Team Working	.31	.42	.23
Valuing Individuals	.28	.38	.20
Meeting Timescales	.18	.39	.17
Checking Things	.34	.40	.21
Following Procedures	.21	.33	.17
Managing Tasks	.32	.36	.19
Upholding Standards	.38	.46	.24
Producing Output	.19	.43	.31
Taking Action	.34	.44	.34
Seizing Opportunities	.27	.31	.32
Pursuing Goals	.39	.49	.37
Mean	**.28**	**.35**	**.25**
Median	**.28**	**.36**	**.23**
Min	**.01**	**.20**	**.06**
Max	**.41**	**.49**	**.46**

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Table 20.8 demonstrates that while 360 behavior ratings often positively correlate with all three Global measures of effectiveness, they often tend to show a higher correlation with one measure than they do with the other two. This provides evidence for a hierarchical model of effectiveness, where individual competencies can contribute to global effectiveness at more than one level. Moreover, results provide support for the notion that the design and development of the behavioral Wave Performance Culture Framework underpins overall effectiveness at work.

Construct Validity: Wave Professional Styles and Wave Focus Styles

This study compared two versions of Wave Styles - Wave Professional Styles and Wave Focus Styles. The 36 dimensions of Wave Professional Styles were correlated with the 36 facets of Wave Focus Styles. Table 20.9 shows the mean and standard deviation for both versions of the Wave questionnaire, along with their construct validity coefficient (r). The median correlation of the Wave Professional Styles dimensions was .71, with a minimum correlation of .50 for Learning Oriented and a maximum of .84 for Conforming. These are not adjusted for any statistical artifacts such as the reliability of the two measures.

Table 20.10 shows the construct correlations for the Wave Professional Styles' Competency Potential scales. As can be seen from the table, these coefficients are slightly larger than for Styles dimensions, consistent with their greater average criterion-related validity. The median coefficient for Wave Competency Potential scales between the two measures was .76, with a minimum correlation of .42 for Adopting Practical Approaches and a maximum of .89 for Following Procedures. This lower correlation for Adopting Practical Approaches is related to the fact that no facet was included in Focus Styles measuring this construct.

Details of the Project Epsom sample can be found in the Appendices.

Table 20.9 36 Wave Professional Styles Dimensions against 36 Wave Focus Styles Facets. *(N=308)*

Professional Styles Dimension	Focus Styles Facet	Professional Styles Dimension		Focus Styles Facet		r
		Mean	SD	Mean	SD	
Analytical	Focused on Information Analysis	61.12	8.94	17.95	5.62	.67
Factual	Focused on Written Communication	64.69	8.92	18.82	6.44	.62
Rational	Data Oriented	50.31	13.37	14.97	6.57	.72
Learning Oriented	Open to Learning	63.73	10.10	22.50	4.24	.51
Practically Minded	Quick Learning	68.35	10.55	22.39	4.17	.50
Insightful	Focused on Improving Things	64.38	8.58	22.53	3.65	.56
Inventive	Creative	53.17	13.00	18.68	4.86	.76
Abstract	Conceptual	56.07	10.95	18.30	4.70	.55
Strategic	Strategic	55.56	10.58	17.55	4.84	.56
Interactive	Lively	56.43	12.64	21.02	5.23	.66
Engaging	Rapport Focused	67.12	11.02	22.77	4.61	.75
Self-promoting	Attention Seeking	46.67	12.41	11.44	5.64	.70
Convincing	Persuasive	53.77	10.44	16.24	4.48	.72
Articulate	Presentation Oriented	57.35	12.03	14.76	6.97	.76
Challenging	Prepared to Disagree	48.07	12.40	15.86	5.28	.66
Purposeful	Responsibility Seeking	52.37	11.79	17.94	5.13	.71
Directing	Leadership Oriented	57.93	13.55	18.34	4.91	.75
Empowering	Motivating	58.74	10.49	20.64	4.43	.72
Self-assured	Self-confident	62.70	10.61	20.18	5.68	.61
Composed	Relaxed at Events	52.21	12.79	13.65	6.19	.76
Resolving	Comfortable with Upset People	58.76	11.38	19.00	5.73	.78
Positive	Optimistic	65.34	10.58	22.91	4.68	.69
Change Oriented	Change Oriented	58.96	11.05	20.63	4.62	.71
Receptive	Responsive to Feedback	59.81	9.99	20.19	4.13	.70
Attentive	Empathic	64.76	11.02	23.29	4.67	.71
Involving	Team Oriented	64.12	9.95	23.39	4.50	.65
Accepting	Considerate	63.71	10.27	24.06	4.17	.60
Reliable	Deadline Focused	66.71	12.50	23.06	4.74	.74
Meticulous	Detail Focused	64.74	12.13	22.07	5.23	.78
Conforming	Rule Focused	56.14	13.89	19.66	5.69	.84
Organized	Methodical	67.29	10.08	22.49	5.09	.79
Principled	Focused on Planning	70.26	9.66	22.16	3.91	.71
Activity Oriented	Quick Working	66.49	10.84	22.25	4.74	.71
Dynamic	Action Oriented	59.05	10.01	21.88	4.00	.64
Enterprising	Business Opportunity Oriented	50.83	14.97	17.53	5.15	.74
Striving	Results Oriented	62.12	10.91	21.00	4.60	.66
	Mean	59.72	11.23	19.78	4.98	.69
	Median	59.43	10.93	20.41	4.79	.71
	Min	46.67	8.58	11.44	3.65	.50
	Max	70.26	14.97	24.06	6.97	.84

*This Professional Styles dimension is repeated as facets which were part of 'Practically Minded' and 'Principled' in Wave Professional Styles were not included in Focus Styles.

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308.

Table 20.10 36 Wave Professional Styles derived Competency Potential scores against 36 Wave Focus Styles derived Competency Potential scores. (N=308)

Professional Styles Competency Potential	Focus Styles Competency Potential	Professional Styles Dimension		Focus Styles Facet		r
		Mean	SD	Mean	SD	
Examining Information	Examining Information	2815.36	434.10	2465.95	458.05	.76
Documenting Facts	Documenting Facts	2957.67	398.84	2631.59	540.11	.74
Interpreting Data	Interpreting Data	2488.13	587.18	2555.79	641.79	.77
Developing Expertise	Developing Expertise	2942.61	431.44	3036.47	413.55	.67
Adopting Practical Approaches	Adopting Practical Approaches	3098.66	445.05	1517.03	266.13	.42
Providing Insights	Providing Insights	2983.51	423.07	2441.96	352.48	.75
Generating Ideas	Generating Ideas	2514.69	606.19	2382.12	458.18	.83
Exploring Possibilities	Exploring Possibilities	2693.75	506.33	2293.43	403.19	.69
Developing Strategies	Developing Strategies	2699.42	465.46	2379.81	429.73	.65
Interacting with People	Interacting with People	2726.13	543.42	2806.19	491.60	.76
Establishing Rapport	Establishing Rapport	3117.21	576.85	2562.31	453.76	.82
Impressing People	Impressing People	2279.98	544.41	1489.39	396.23	.71
Convincing People	Convincing People	2489.16	514.22	2402.95	439.75	.81
Articulating Information	Articulating Information	2663.79	550.48	2808.19	568.46	.85
Challenging Ideas	Challenging Ideas	2455.96	510.67	2291.55	513.99	.70
Making Decisions	Making Decisions	2487.05	581.63	2082.69	435.06	.80
Directing People	Directing People	2855.53	581.75	3376.32	626.22	.77
Empowering Individuals	Empowering Individuals	2888.98	464.76	3434.35	508.02	.72
Conveying Self-Confidence	Conveying Self-Confidence	2838.22	504.23	3064.75	572.61	.69
Showing Composure	Showing Composure	2622.70	526.69	2432.67	512.20	.74
Resolving Conflict	Resolving Conflict	2944.61	475.39	2918.69	516.06	.77
Thinking Positively	Thinking Positively	3096.61	472.93	2771.29	440.39	.76
Embracing Change	Embracing Change	2782.38	503.20	3192.65	485.81	.77
Inviting Feedback	Inviting Feedback	2845.55	423.25	3214.79	409.63	.72
Understanding People	Understanding People	3099.69	571.97	2955.43	544.10	.80
Team Working	Team Working	3035.04	452.79	2910.16	419.63	.76
Valuing Individuals	Valuing Individuals	3074.57	511.43	2805.76	466.22	.74
Meeting Timescales	Meeting Timescales	3226.18	601.06	2993.80	515.82	.82
Checking Things	Checking Things	3137.37	576.93	2444.37	461.35	.84
Following Procedures	Following Procedures	2966.34	658.37	2516.28	525.16	.89
Managing Tasks	Managing Tasks	3136.40	437.91	2430.92	358.87	.79
Upholding Standards	Upholding Standards	3348.29	472.80	2577.20	365.21	.58
Producing Output	Producing Output	3212.51	493.67	2648.63	416.44	.75
Taking Action	Taking Action	2750.55	489.80	2795.91	414.88	.75
Seizing Opportunities	Seizing Opportunities	2490.41	673.00	2728.73	521.82	.80
Pursuing Goals	Pursuing Goals	2833.80	545.64	2553.72	456.52	.75
	Mean	2849.97	515.47	2636.50	466.64	.75
	Median	2850.54	508.50	2604.40	458.12	.76
	Min	2279.98	398.84	1489.39	266.13	.42
	Max	3348.29	673.00	3434.35	641.79	.89

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308

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Intercorrelation – Construct Separation

The 36 dimensions of Wave Professional Styles show clear construct separation from each other with every single dimension in the Invited Access form having the highest correlation with its respective scale in the Supervised Access form. As an example, the Inventive dimension in the Invited Access form correlates most strongly with Inventive in the Supervised Access form, not with Abstract nor any other scale. The highest non-matched correlation is .60 between Reliable (SA) and Organized (IA) with their respective alternate form reliabilities being .91 and .88 (N=1,153) (See Reliability chapter). The average intercorrelation of the normative questionnaires is only .26 and on the combined ipsative and normative scores the average intercorrelation of the 36 dimensions is .06.

For more details on intercorrelations between Wave dimensions, please see Appendices.

Construct Validity of Facet Scales

One method for understanding the separation of constructs is that individual facet scales have unique variance which is not individually captured by another scale. The alternate form matrix of the two forms of Wave Professional Styles facet scales provides a method of understanding the construct separation of 108 two item facet scales. The main diagonal of 108 correlations of this matrix provides the alternate form reliabilities of the facet scales (alternate form reliabilities range from .50 to .90 for two item facet scales (ra-ra) with median of .78 (N=1,153)). Construct separation is indicated with the off diagonal correlations being of lower value than this main diagonal. In total there are 11,556 off-diagonals. The main diagonal was higher than the off diagonals in all but two cases, demonstrating strong construct separation. The two cases of facet construct overlap occurred in each case with facets from the main and off diagonal coming from within the same dimension.

Wave Styles and Other Personality Assessments

The following tables display correlations between Wave Styles dimensions and scales of other instruments. Correlations shown are not a priori hypothesized but are merely provided to aid the user's understanding of Wave dimensions.

Table 20.11 Wave Dimension ANALYTICAL

WAVE DIMENSION: ANALYTICAL

Correlations with Other Assessments: Those high on Wave Styles Analytical are…

Likely to be high on…			Likely to be low on…		
OPQ	**Evaluative**	**r= .42**	OPQ	Affiliative	r= -.29
	Data Rational	**r= .40**			
NEO	**O5 Ideas**	**r= .42**	NEO	E1 Warmth	r= -.21
16PF	Reasoning	r= .33	16PF	Warmth	r= -.28
FiroB	Scale E "I control people"	r= .27	FiroB	Scale I "I am open with people"	r= -.16
				Scale K "People are open with me"	r= -.16
HPI	**Curiosity**	**r= .41**	HPI	Likes People	r= -.26
DISC	Dominance	r= .22	DISC	Influence	r= -.22
HDS	Reserved	r= .23	HDS	Dutiful	r= -.23
MBTI	**Thinking**	**r= .41**	MBTI	**Feeling**	**r= -.41**

Table 20.12 Wave Dimension Factual

WAVE DIMENSION: FACTUAL

Correlations with Other Assessments: Those high on Wave Styles Factual are…

Likely to be high on…			Likely to be low on…		
OPQ	Evaluative	r= .39	OPQ	Optimistic	r= -.22
NEO	O6 Values	r= .19	NEO	Extraversion (Global factor)	r= -.11
	Openness (Global factor)	r= .19			
16PF	Reasoning	r= .29	16PF	Warmth	r= -.13
FiroB	Scale L "I want people to be open with me"	r= .16	FiroB	Scale J "I want to be open with people"	r= -.04
HPI	Education	r= .28	HPI	Likes People	r= -.20
DISC	Compliance	r= .13	DISC	Influence	r= -.15
HDS	Reserved	r= .09	HDS	Colorful	r= -.16
MBTI	Intuition	r= .15	MBTI	Sensing	r= -.15

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Table 20.13 Wave Dimension RATIONAL

WAVE DIMENSION: RATIONAL					
Correlations with Other Assessments: Those high on Wave Styles Rational are...					
Likely to be high on...			Likely to be low on...		
OPQ	**Data-rational**	**r= .61**	OPQ	Affiliative	r= -.28
NEO	C2 Order	r= .21	NEO	O3 Feelings	r= -.36
	C6 Deliberation	r= .21			
16PF	Privateness	r= .20	16PF	**Sensitivity**	**r= -.50**
				Warmth	**r= -.40**
FiroB	Scale F		FiroB	Scale K	
	"I want to control people"	r= .18		"People are open with me"	r= -.16
HPI	**Math Ability**	**r= .44**	HPI	Likes People	r= -.23
	Curiosity	**r= .41**			
DISC	Dominance	r= .09	DISC	Influence	r= -.17
HDS	Reserved	r= .22	HDS	Excitable	r= -.14
MBTI	Thinking	r= .38	MBTI	Feeling	r= -.38

Table 20.14 Wave Dimension LEARNING ORIENTED

WAVE DIMENSION: LEARNING ORIENTED					
Correlations with Other Assessments: Those high on Wave Styles Learning Oriented are...					
Likely to be high on...			Likely to be low on...		
OPQ	Conceptual	r= .38	OPQ	Caring	r= -.18
NEO	O5 Ideas	r= .34	NEO	A3 Altruism	r= -.17
16PF	Openness to Change	r= .25	16PF	Warmth	r= -.20
FiroB	Scale A "I include people"	r= .10	FiroB	Scale I	
	Scale E "I control people"	r= .10		"I am open with people"	r= -.12
HPI	**Reading**	**r= .45**	HPI	Caring	r= -.23
DISC	Dominance	r= .12	DISC	Steadiness	r= -.09
HDS	Imaginative	r= .13	HDS	Dutiful	r= -.21
	Reserved	r= .13			
MBTI	Intuition	r= .21	MBTI	Sensing	r= -.21

Table 20.15 Wave Dimension PRACTICALLY MINDED

WAVE DIMENSION: PRACTICALLY MINDED

Correlations with Other Assessments: Those high on Wave Styles Practically Minded are...

Likely to be high on...			Likely to be low on...		
OPQ	Detail Conscious	r= .25	OPQ	Behavioral	r= -.21
NEO	C1 Competence	r= .17	NEO	O1 Fantasy	r= -.20
16PF	Perfectionism	r= .11	16PF	Abstractedness	r= -.29
FiroB	Scale C "Others include me"	r= .07	FiroB	Need for Control	r= -.11
HPI	Calmness	r= .16	HPI	Education	r= -.19
	Curiosity	r= .16			
DISC	Steadiness	r= .09	DISC	Influence	r= -.12
HDS	Diligent	r= .16	HDS	Colorful	r= -.16
MBTI	Sensing	r= .24	MBTI	Intuition	r= -.24

Table 20.16 Wave Dimension INSIGHTFUL

WAVE DIMENSION: INSIGHTFUL

Correlations with Other Assessments: Those high on Wave Styles Insightful are...

Likely to be high on...			Likely to be low on...		
OPQ	Evaluative	r= .28	OPQ	Affiliative	r= -.34
NEO	C1 Competence	r= .27	NEO	N6 Vulnerability	r= -.25
16PF	Self-reliance	r= .27	16PF	Warmth	r= -.29
FiroB	Scale F "I want to control people"	r= .34	FiroB	Scale G "People control me"	r= -.13
HPI	Curiosity	r= .28	HPI	Impulse Control	r= -.20
DISC	Dominance	r= .37	DISC	Steadiness	r= -.29
HDS	Bold	r= .26	HDS	Dutiful	r= -.31
	Mischievous	r= .26			
MBTI	Thinking	r= .29	MBTI	Feeling	r= -.29

Table 20.17 Wave Dimension INVENTIVE

WAVE DIMENSION: INVENTIVE						
Correlations with Other Assessments: Those high on Wave Styles Inventive are…						

Likely to be high on…			Likely to be low on…		
OPQ	**Innovative**	**r= .76**	OPQ	**Rule Following**	**r= -.49**
				Conventional	**r= -.46**
NEO	Openness (Global factor)	r= .39	NEO	C6 Deliberation	r= -.24
16PF	**Abstractedness**	**r= .45**	16PF	Rule Conscious	r= -.26
	Openness to Change	**r= .45**			
FiroB	Scale E "I control people"	r= .39	FiroB	Scale J "I want to be open with people"	r= -.12
HPI	**Generates Ideas**	**r= .52**	HPI	**Impulse Control**	**r= -.43**
DISC	**Dominance**	**r= .43**	DISC	Steadiness	r= -.37
HDS	**Imaginative**	**r= .48**	HDS	Dutiful	r= -.27
MBTI	**Intuition**	**r= .51**	MBTI	**Sensing**	**r= -.51**

Table 20.18 Wave Dimension ABSTRACT

WAVE DIMENSION: ABSTRACT						
Correlations with Other Assessments: Those high on Wave Styles Abstract are…						

Likely to be high on…			Likely to be low on…		
OPQ	**Conceptual**	**r= .61**	OPQ	Trusting	r= -.25
NEO	**O5 Ideas**	**r= .48**	NEO	E1 Warmth	r= -.21
	Openness (Global factor)	**r= .40**		Extraversion (Global factor)	r= -.21
16PF	Openness to Change	r= .37	16PF	Warmth	r= -.26
FiroB	Scale E "I control people"	r= .23	FiroB	Scale J "I want to be open with people"	r= -.14
	Need for Control	r= .23			
HPI	Science Ability	r= .39	HPI	Likes People	r= -.21
				Not Spontaneous	r= -.21
DISC	Dominance	r= .17	DISC	Influence	r= -.25
HDS	Imaginative	r= .27	HDS	Dutiful	r= -.15
MBTI	Intuition	r= .35	MBTI	Sensing	r= -.35

Table 20.19 Wave Dimension STRATEGIC

WAVE DIMENSION: STRATEGIC

Correlations with Other Assessments: Those high on Wave Styles Strategic are…

Likely to be high on…			Likely to be low on…		
OPQ	**Forward Thinking**	**r= .47**	OPQ	Conventional	r= -.36
NEO	C4 Achievement Striving	r= .34	NEO	Agreeableness (Global factor)	r= -.28
16PF	Openness to Change	r= .35	16PF	Rule Consciousness	r= -.16
FiroB	Scale E "I control people"	r= .37	FiroB	Scale J "I want to be open with people"	r= -.06
HPI	Competitive	r= .37	HPI	Impulse Control	r= -.20
DISC	Dominance	r= .37	DISC	Steadiness	r= -.34
HDS	Bold	r= .31	HDS	Dutiful	r= -.19
MBTI	Intuition	r= .25	MBTI	Sensing	r= -.25

Table 20.20 Wave Dimension INTERACTIVE

WAVE DIMENSION: INTERACTIVE

Correlations with Other Assessments: Those high on Wave Styles Interactive are…

Likely to be high on…			Likely to be low on…		
OPQ	**Outgoing**	**r= .73**	OPQ	Emotionally Controlled	r= -.37
	Socially Confident	**r= .47**			
	Affiliative	**r= .41**			
NEO	**Extraversion (Global factor)**	**r= .54**	NEO	C6 Deliberation	r= -.26
	E2 Gregariousness	**r= .52**			
	E1 Warmth	**r= .46**			
16PF	**Social Boldness**	**r= .57**	16PF	**Privateness**	**r= -.42**
	Liveliness	**r= .50**		**Self-Reliance**	**r= -.41**
	Warmth	**r= .45**			
FiroB	Scale A "I include people"	r= .33	FiroB	n/a	
HPI	**Likes People**	**r= .51**	HPI	Impulse Control	r= -.16
	Exhibitionistic	**r= .41**			
DISC	**Influence**	**r= .58**	DISC	Compliance	r= -.32
HDS	**Colorful**	**r= .44**	HDS	**Reserved**	**r= -.43**
MBTI	**Extraversion**	**r= .71**	MBTI	**Introversion**	**r= -.71**

Table 20.21 Wave Dimension ENGAGING

WAVE DIMENSION: ENGAGING						
Correlations with Other Assessments: Those high on Wave Styles Engaging are...						
Likely to be high on...				**Likely to be low on...**		
OPQ	**Socially Confident**	**r= .55**		OPQ	Emotionally Controlled	r= -.32
	Outgoing	**r= .48**				
	Affiliative	**r= .41**				
NEO	**E1 Warmth**	**r= .62**		NEO	N4 Self-consciousness	r= -.23
	Extraversion (Global factor)	**r= .59**				
	E2 Gregariousness	**r= .54**				
16PF	**Social Boldness**	**r= .52**		16PF	**Self-reliance**	**r= -.42**
	Warmth	**r= .48**				
	Liveliness	**r= .48**				
FiroB	Scale A "I include people"	r= .38		FiroB	Need for Control	r= -.08
HPI	**Likes People**	**r= .58**		HPI	Science Ability	r= -.13
DISC	**Influence**	**r= .56**		DISC	Dominance	r= -.27
HDS	Colorful	r= .32		HDS	**Reserved**	**r= -.61**
MBTI	**Extraversion**	**r= .65**		MBTI	**Introversion**	**r= -.65**

Table 20.22 Wave Dimension SELF-PROMOTING

WAVE DIMENSION: SELF-PROMOTING						
Correlations with Other Assessments: Those high on Wave Styles Self-promoting are...						
Likely to be high on...				**Likely to be low on...**		
OPQ	**Outgoing**	**r= .45**		OPQ	**Modest**	**r= -.49**
NEO	E2 Gregariousness	r= .30		NEO	**A5 Modesty**	**r= -.51**
16PF	Social Boldness	r= .35		16PF	Privateness	r= -.28
FiroB	Need for Control	r= .37		FiroB	n/a	
HPI	**Exhibitionistic**	**r= .57**		HPI	Impression Management	r= -.26
	Entertaining	**r= .40**				
DISC	Influence	r= .28		DISC	Steadiness	r= -.23
HDS	**Colorful**	**r= .51**		HDS	Reserved	r= -.18
MBTI	Extraversion	r= .36		MBTI	Introversion	r= -.36

Table 20.23 Wave Dimension CONVINCING

WAVE DIMENSION: CONVINCING						
Correlations with Other Assessments: Those high on Wave Styles Convincing are…						
Likely to be high on…				**Likely to be low on…**		
OPQ	**Outspoken**	**r= .49**		OPQ	Trusting	r= -.37
	Persuasive	**r= .43**				
	Controlling	**r= .43**				
NEO	**E3 Assertiveness**	**r= .47**		NEO	**Agreeableness (Global factor)**	**r= -.53**
					A4 Compliance	**r= -.48**
					A2 Straightforwardness	**r= -.40**
16PF	**Dominance**	**r= .50**		16PF	Impression Management	r= -.16
FiroB	**Scale E "I control people"**	**r= .58**		FiroB	Scale J "I want to be open with people"	r= -.04
	Scale F "I want to control people"	**r= .46**				
	Need for Control (Global scale)	**r= .42**				
HPI	**Leadership**	**r= .46**		HPI	Avoids Trouble	r= -.32
DISC	**Dominance**	**r= .43**		DISC	Steadiness	r= -.37
HDS	Bold	r= .38		HDS	Cautious	r= -.30
	Colorful	r= .38			Dutiful	r= -.30
MBTI	Thinking	r= .29		MBTI	Feeling	r= -.29

Table 20.24 Wave Dimension ARTICULATE

WAVE DIMENSION: ARTICULATE						
Correlations with Other Assessments: Those high on Wave Styles Articulate are…						
Likely to be high on…				**Likely to be low on…**		
OPQ	**Socially Confident**	**r= .59**		OPQ	**Worrying**	**r= -.43**
	Outgoing	**r= .40**				
NEO	**E3 Assertiveness**	**r= .45**		NEO	N4 Self-consciousness	r= -.39
16PF	**Social Boldness**	**r= .65**		16PF	Self-reliance	r= -.27
FiroB	Scale E "I control people"	r= .35		FiroB	Scale G "People control me"	r= -.06
HPI	**No Social Anxiety**	**r= .63**		HPI	Impulse Control	r= -.09
	Self-Confidence	**r= .41**				
DISC	**Influence**	**r= .41**		DISC	Compliance	r= -.23
					Steadiness	r= -.23
HDS	Colorful	r= .46		HDS	**Cautious**	**r= -.44**
MBTI	**Extraversion**	**r= .47**		MBTI	**Introversion**	**r= -.47**

Table 20.25 Wave Dimension CHALLENGING

WAVE DIMENSION: CHALLENGING					
Correlations with Other Assessments: Those high on Wave Styles Challenging are...					
Likely to be high on...			**Likely to be low on...**		
OPQ	**Outspoken**	**r= .56**	OPQ	Trusting	r= -.34
NEO	N2 Angry Hostility	r= .34	NEO	**A4 Compliance**	**r= -.52**
				Agreeableness (Global factor)	**r= -.51**
				A2 Straightforwardness	**r= -.41**
16PF	**Dominance**	**r= .45**	16PF	Impression Management	r= -.24
FiroB	**Scale E "I control people"**	**r= .44**	FiroB	Scale K "People are open with me"	r= -.13
HPI	**Leadership**	**r= .40**	HPI	No Hostility	r= -.36
DISC	**Dominance**	**r= .50**	DISC	Steadiness	r= -.37
HDS	Imaginative	r= .39	HDS	Dutiful	r= -.30
MBTI	Thinking	r= .34	MBTI	Feeling	r= -.34

Table 20.26 Wave Dimension PURPOSEFUL

WAVE DIMENSION: PURPOSEFUL					
Correlations with Other Assessments: Those high on Wave Styles Purposeful are...					
Likely to be high on...			**Likely to be low on...**		
OPQ	**Decisive**	**r= .54**	OPQ	Caring	r= -.39
	Controlling	**r= .43**			
NEO	**E3 Assertiveness**	**r= .48**	NEO	Agreeableness (Global factor)	r= -.36
16PF	Dominance	r= .39	16PF	Apprehension	r= -.26
FiroB	**Scale E - "I control people"**	**r= .44**	FiroB	Scale G "People control me"	r= -.20
HPI	**Leadership**	**r= .48**	HPI	Impulse Control	r= -.29
DISC	**Dominance**	**r= .46**	DISC	Steadiness	r= -.37
HDS	Mischievous	r= .36	HDS	**Dutiful**	**r= -.40**
MBTI	Thinking	r= .32	MBTI	Feeling	r= -.32

Table 20.27 Wave Dimension DIRECTING

WAVE DIMENSION: DIRECTING						
Correlations with Other Assessments: Those high on Wave Styles Directing are...						
Likely to be high on...			Likely to be low on...			
OPQ	**Controlling**	**r= .78**	OPQ	Conventional	r= -.31	
				Worrying	r= -.31	
NEO	**E3 Assertiveness**	**r= .68**	NEO	Agreeableness (Global factor)	r= -.33	
16PF	**Dominance**	**r= .46**	16PF	Sensitivity	r= -.18	
	Social Boldness	**r= .44**				
FiroB	**Scale E "I control people"**	**r= .61**	FiroB	Scale G "People control me"	r= -.18	
	Scale F "I want to control people"	**r= .42**				
HPI	**Leadership**	**r= .73**	HPI	Impulse Control	r= -.17	
	No Social Anxiety	**r= .40**				
DISC	Dominance	r= .33	DISC	Steadiness	r= -.32	
HDS	**Bold**	**r= .43**	HDS	**Cautious**	**r= -.41**	
MBTI	Extraversion	r= .26	MBTI	Introversion	r= -.26	

Table 20.28 Wave Dimension EMPOWERING

WAVE DIMENSION: EMPOWERING						
Correlations with Other Assessments: Those high on Wave Styles Empowering are...						
Likely to be high on...			Likely to be low on...			
OPQ	Controlling	r= .30	OPQ	Conventional	r= -.35	
NEO	E3 Assertiveness	r= .35	NEO	C6 Deliberation	r= -.21	
16PF	Social Boldness	r= .30	16PF	Tension	r= -.14	
FiroB	Scale E "I control people"	r= .34	FiroB	Scale J "I want to be open with people"	r= -.03	
HPI	Leadership	r= .30	HPI	Impulse Control	r= -.19	
DISC	Influence	r= .18	DISC	Compliance	r= -.18	
HDS	Colorful	r= .37	HDS	Reserved	r= -.20	
MBTI	Extraversion	r= .26	MBTI	Introversion	r= -.26	

Table 20.29 Wave Dimension SELF-ASSURED

WAVE DIMENSION: SELF-ASSURED

Correlations with Other Assessments: Those high on Wave Styles Self-assured are...

Likely to be high on...			Likely to be low on...		
OPQ	**Optimistic**	**r= .43**	OPQ	Democratic	r= -.23
				Modest	r= -.23
NEO	E6 Positive Emotions	r= .29	NEO	N3 Depression	r= -.38
16PF	Emotional Stability	r= .27	16PF	Apprehension	r= -.25
FiroB	Scale E "I control people"	r= .22	FiroB	Scale G "People control me"	r= -.06
	Scale F "I want to control people"	r= .22			
HPI	Self-Confidence	r= .36	HPI	Reading	r= -.16
				Impulse Control	r= -.16
DISC	Influence	r= .29	DISC	Steadiness	r= -.31
HDS	Bold	r= .34	HDS	Cautious	r= -.26
MBTI	Extraversion	r= .15	MBTI	Introversion	r= -.15

Table 20.30 Wave Dimension COMPOSED

WAVE DIMENSION: COMPOSED

Correlations with Other Assessments: Those high on Wave Styles Composed are...

Likely to be high on...			Likely to be low on...		
OPQ	**Relaxed**	**r= .44**	OPQ	**Worrying**	**r= -.65**
NEO	E3 Assertiveness	r= .31	NEO	**N1 Anxiety**	**r= -.54**
				Neuroticism (Global factor)	**r= -.47**
				N4 Self-Consciousness	**r= -.40**
				N6 Vulnerability	**r= -.40**
16PF	Social Boldness	r= .30	16PF	Apprehension	r= -.38
FiroB	Scale E "I control people"	r= .27	FiroB	Scale G "People control me"	r= -.14
HPI	**No Social Anxiety**	**r= .45**	HPI	Not Spontaneous	r= -.23
	Not Anxious	**r= .44**			
DISC	Dominance	r= .25	DISC	Compliance	r= -.29
HDS	Mischievous	r= .31	HDS	**Cautious**	**r= -.48**
MBTI	Perceiving	r= .25	MBTI	Judging	r= -.25

Table 20.31 Wave Dimension RESOLVING

WAVE DIMENSION: RESOLVING

Correlations with Other Assessments: Those high on Wave Styles Resolving are...

Likely to be high on...			Likely to be low on...		
OPQ	Caring	r= .37	OPQ	Competitive	r= -.21
NEO	Extraversion (Global factor)	r= .20	NEO	N4 Self-consciousness	r= -.11
16PF	Warmth	r= .32	16PF	Tension	r= -.28
FiroB	Scale K "People are open with me"	r= .17	FiroB	Scale D "I want others to include me"	r= -.01
HPI	Caring	r= .21	HPI	Math Ability	r= -.08
DISC	Steadiness	r= .14	DISC	Dominance	r= -.13
HDS	Colorful	r= .15	HDS	Reserved	r= -.21
MBTI	Feeling	r= .17	MBTI	Thinking	r= -.17

Table 20.32 Wave Dimension POSITIVE

WAVE DIMENSION: POSITIVE

Correlations with Other Assessments: Those high on Wave Styles Positive are...

Likely to be high on...			Likely to be low on...		
OPQ	**Optimistic**	**r= .57**	OPQ	Evaluative	r= -.33
NEO	**E6 Positive Emotions**	**r= .44**	NEO	**N3 Depression**	**r= -.51**
				Neuroticism (Global factor)	**r= -.49**
				N2 Angry Hostility	**r= -.43**
				N1 Anxiety	**r= -.42**
				N6 Vulnerability	**r= -.40**
16PF	**Emotional Stability**	**r= .48**	16PF	Tension	r= -.37
FiroB	Scale A "I include people"	r= .18	FiroB	Scale G "People control me"	r= -.20
HPI	**Empathy**	**r= .48**	HPI	Self Focus	r= -.21
	No Depression	**r= .40**			
DISC	**Influence**	**r= .45**	DISC	Compliance	r= -.23
HDS	Colorful	r= .19	HDS	**Excitable**	**r= -.49**
MBTI	Extraversion	r= .28	MBTI	Introversion	r= -.28

Table 20.33 Wave Dimension CHANGE ORIENTED

WAVE DIMENSION: CHANGE ORIENTED					
Correlations with Other Assessments: Those high on Wave Styles Change Oriented are...					
Likely to be high on...			**Likely to be low on...**		
OPQ	Variety Seeking	r= .31	OPQ	Rule Following	r= -.39
NEO	**O4 Actions**	**r= .40**	NEO	**Neuroticism (Global factor)**	**r= -.44**
				N1 Anxiety	**r= -.43**
				N6 Vulnerability	**r= -.40**
16PF	Openness to Change	r= .35	16PF	Apprehension	r= -.30
FiroB	Scale E "I control people"	r= .14	FiroB	Scale G "People control me"	r= -.17
HPI	Experience Seeking	r= .35	HPI	Not Spontaneous	r= -.34
DISC	Dominance	r= .25	DISC	Compliance	r= -.25
HDS	Mischievous	r= .36	HDS	Cautious	r= -.37
MBTI	Perceiving	r= .33	MBTI	Judging	r= -.33

Table 20.34 Wave Dimension RECEPTIVE

WAVE DIMENSION: RECEPTIVE					
Correlations with Other Assessments: Those high on Wave Styles Receptive are...					
Likely to be high on...			**Likely to be low on...**		
OPQ	Democratic	r= .26	OPQ	Decisive	r= -.20
NEO	O3 Feelings	r= .14	NEO	C1 Competence	r= -.07
	N1 Anxiety	r= .14			
16PF	Warmth	r= .21	16PF	Self-Reliance	r= -.14
				Privateness	r= -.14
FiroB	Scale B "I want to include people"	r= .18	FiroB	n/a	
HPI	Self Focus	r= .25	HPI	Not Anxious	r= -.14
DISC	Compliance	r= .03	DISC	Influence	r= -.07
HDS	Unlikeness	r= .18	HDS	Reserved	r= -.12
MBTI	Feeling	r= .14	MBTI	Thinking	r= -.14

Table 20.35 Wave Dimension ATTENTIVE

WAVE DIMENSION: ATTENTIVE

Correlations with Other Assessments: Those high on Wave Styles Attentive are...

Likely to be high on...			Likely to be low on...		
OPQ	**Behavioral**	**r= .66**	OPQ	Competitive	r= -.32
	Caring	**r= .58**			
	Democratic	**r= .41**			
NEO	**O3 Feelings**	**r= .42**	NEO	E3 Assertiveness	r= -.25
16PF	**Warmth**	**r= .43**	16PF	Dominance	r= -.22
FiroB	Scale B "I want to include people"	r= .25	FiroB	Scale E "I control people"	r= -.28
HPI	Sensitive	r= .35	HPI	Leadership	r= -.24
DISC	Steadiness	r= .27	DISC	Dominance	r= -.36
HDS	Dutiful	r= .26	HDS	Reserved	r= -.25
MBTI	**Feeling**	**r= .47**	MBTI	**Thinking**	**r= -.47**

Table 20.36 Wave Dimension INVOLVING

WAVE DIMENSION: INVOLVING

Correlations with Other Assessments: Those high on Wave Styles Involving are...

Likely to be high on...			Likely to be low on...		
OPQ	**Democratic**	**r= .53**	OPQ	**Independent-minded**	**r= -.43**
	Caring	**r= .46**			
NEO	**Agreeableness (Global factor)**	**r= .44**	NEO	E4 Activity	r= -.18
				N2 Angry Hostility	r= -.18
16PF	Warmth	r= .27	16PF	Self-Reliance	r= -.35
FiroB	Scale I "I am open with people"	r= .17	FiroB	Scale E "I control people"	r= -.26
HPI	No Hostility	r= .28	HPI	Leadership	r= -.27
DISC	**Steadiness**	**r= .44**	DISC	**Dominance**	**r= -.41**
HDS	Dutiful	r= .32	HDS	Reserved	r= -.28
				Mischievous	r= -.28
MBTI	Feeling	r= .33	MBTI	Thinking	r= -.33

Table 20.37 Wave Dimension ACCEPTING

WAVE DIMENSION: ACCEPTING						
Correlations with Other Assessments: Those high on Wave Styles Accepting are...						
Likely to be high on...			Likely to be low on...			
OPQ	**Trusting**	**r= .54**	OPQ	Independent-minded	r= -.37	
	Caring	**r= .50**				
NEO	**Agreeableness (Global factor)**	**r= .62**	NEO	N2 Angry Hostility	r= -.34	
	A1 Trust	**r= .56**				
	A4 Compliance	**r= .44**				
	A6 Tender-Mindedness	**r= .40**				
16PF	Warmth	r= .29	16PF	Vigilance	r= -.39	
				Tension	r= -.39	
FiroB	Scale G "People control me"	r= .17	FiroB	Scale E "I control people"	r= -.34	
HPI	**Trusting**	**r= .40**	HPI	Leadership	r= -.33	
DISC	**Steadiness**	**r= .43**	DISC	**Dominance**	**r= -.49**	
HDS	Dutiful	r= .36	HDS	**Skeptical**	**r= -.40**	
MBTI	Feeling	r= .37	MBTI	Thinking	r= -.37	

Table 20.38 Wave Dimension RELIABLE

WAVE DIMENSION: RELIABLE						
Correlations with Other Assessments: Those high on Wave Styles Reliable are...						
Likely to be high on...			Likely to be low on...			
OPQ	**Conscientious**	**r= .61**	OPQ	Independent-minded	r= -.31	
	Detail Conscious	**r= .46**				
NEO	**C5 Self-Discipline**	**r= .56**	NEO	O1 Fantasy	r= -.32	
	Conscientious (Global factor)	**r= .49**				
	C2 Order	**r= .46**				
	C3 Dutifulness	**r= .43**				
16PF	**Perfectionism**	**r= .49**	16PF	**Abstractedness**	**r= -.44**	
FiroB	Scale K "People are open with me"	r= .14	FiroB	Scale E "I control people"	r= -.20	
HPI	Mastery	r= .39	HPI	Exhibitionistic	r= -.25	
DISC	Steadiness	r= .32	DISC	Dominance	r= -.28	
HDS	**Diligent**	**r= .46**	HDS	Imaginative	r= -.27	
MBTI	**Judging**	**r= .48**	MBTI	**Perceiving**	**r= -.48**	

Table 20.39 Wave Dimension METICULOUS

WAVE DIMENSION: METICULOUS

Correlations with Other Assessments: Those high on Wave Styles Meticulous are...

Likely to be high on...			Likely to be low on...		
OPQ	**Detail Conscious**	**r= .60**	OPQ	Variety Seeking	r= -.30
	Conscientious	**r= .44**			
	Rule Following	**r= .40**			
NEO	**Conscientious (Global factor)**	**r= .49**	NEO	Openness (Global factor)	r= -.24
	C2 Order	**r= .46**			
16PF	**Perfectionism**	**r= .58**	16PF	Abstractedness	r= -.32
FiroB	Scale K "People are open with me"	r= .18	FiroB	Scale E "I control people"	r= -.08
	Need for Openness	r= .18		Scale A "I include people"	r= -.08
HPI	**Mastery**	**r= .41**	HPI	No Social Anxiety	r= -.24
DISC	Compliance	r= .32	DISC	Influence	r= -.24
HDS	**Diligent**	**r= .62**	HDS	Colorful	r= -.32
MBTI	Judging	r= .35	MBTI	Perceiving	r= -.35

Table 20.40 Wave Dimension CONFORMING

WAVE DIMENSION: CONFORMING

Correlations with Other Assessments: Those high on Wave Styles Conforming are...

Likely to be high on...			Likely to be low on...		
OPQ	**Rule Following**	**r= .75**	OPQ	**Variety Seeking**	**r= -.47**
	Conventional	**r= .61**		**Innovative**	**r= -.46**
	Detail Conscious	**r= .53**			
NEO	C6 Deliberation	r= .39	NEO	**O4 Actions**	**r= -.46**
				Openness (Global factor)	**r= -.45**
16PF	**Rule Consciousness**	**r= .47**	16PF	**Openness to Change**	**r= -.55**
	Perfectionism	**r= .42**		**Abstractedness**	**r= -.41**
FiroB	Scale G "People control me"	r= .23	FiroB	Scale E "I control people"	r= -.35
HPI	**Impulse Control**	**r= .45**	HPI	**Experience Seeking**	**r= -.46**
				Leadership	**r= -.42**
				Generates Ideas	**r= -.40**
DISC	**Compliance**	**r= .51**	DISC	**Dominance**	**r= -.51**
	Steadiness	**r= .46**			
HDS	**Dutiful**	**r= .49**	HDS	**Mischievous**	**r= -.48**
	Cautious	**r= .40**		**Imaginative**	**r= -.40**
MBTI	**Sensing**	**r= .49**	MBTI	**Intuition**	**r= -.49**
	Judging	**r= .48**		**Perceiving**	**r= -.48**

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Table 20.41 Wave Dimension ORGANIZED

WAVE DIMENSION: ORGANIZED					
Correlations with Other Assessments: Those high on Wave Styles Organized are...					
Likely to be high on...			Likely to be low on...		
OPQ	**Detail Conscious**	**r= .61**	OPQ	Variety Seeking	r= -.28
	Conscientious	**r= .54**			
NEO	**C2 Order**	**r= .63**	NEO	O1 Fantasy	r= -.33
	Conscientious (Global factor)	**r= .61**			
	C5 Self-Discipline	**r= .53**			
	C6 Deliberation	**r= .41**			
16PF	**Perfectionism**	**r= .61**	16PF	**Abstractedness**	**r= -.41**
FiroB	Scale K "People are open with me"	r= .12	FiroB	Scale D "Others want to include me"	r= -.05
HPI	**Mastery**	**r= .40**	HPI	Thrill Seeking	r= -.24
DISC	Compliance	r= .21	DISC	Dominance	r= -.15
HDS	**Diligent**	**r= .55**	HDS	Imaginative	r= -.31
MBTI	**Judging**	**r= .64**	MBTI	**Perceiving**	**r= -.64**

Table 20.42 Wave Dimension PRINCIPLED

WAVE DIMENSION: PRINCIPLED					
Correlations with Other Assessments: Those high on Wave Styles Principled are...					
Likely to be high on...			Likely to be low on...		
OPQ	Conscientious	r= .30	OPQ	Outgoing	r= -.25
NEO	C3 Dutifulness	r= .38	NEO	O1 Fantasy	r= -.15
16PF	Rule Consciousness	r= .34	16PF	Abstractedness	r= -.22
FiroB	Scale K "People are open with me"	r= .15	FiroB	Need for Control	r= -.17
HPI	Impulse Control	r= .19	HPI	Exhibitionistic	r= -.22
	Mastery	r= .19			
DISC	Compliance	r= .27	DISC	Dominance	r= -.22
HDS	Diligent	r= .19	HDS	Mischievous	r= -.30
MBTI	Judging	r= .18	MBTI	Perceiving	r= -.18

Table 20.43 Wave Dimension ACTIVITY ORIENTED

WAVE DIMENSION: ACTIVITY ORIENTED

Correlations with Other Assessments: Those high on Wave Styles Activity Oriented are...

Likely to be high on...			Likely to be low on...		
OPQ	**Vigorous**	**r= .51**	OPQ	Conceptual	r= -.16
				Democratic	r= -.16
NEO	E4 Activity	r= .25	NEO	N6 Vulnerability	r= -.19
16PF	Perfectionism	r= .16	16PF	Abstractedness	r= -.19
FiroB	Scale K "People are open with me"	r= .13	FiroB	Need for Control	r= -.08
				Scale G "People control me"	r= -.08
HPI	Reading	r= .19	HPI	Entertaining	r= -.20
DISC	Dominance	r= .09	DISC	Compliance	r= -.10
HDS	Diligent	r= .21	HDS	Reserved	r= -.12
				Excitable	r= -.12
MBTI	Sensing	r= .10	MBTI	Intuition	r= -.10

Table 20.44 Wave Dimension DYNAMIC

WAVE DIMENSION: DYNAMIC

Correlations with Other Assessments: Those high on Wave Styles Dynamic are...

Likely to be high on...			Likely to be low on...		
OPQ	Controlling	r= .39	OPQ	**Conventional**	**r= -.44**
NEO	**E4 Activity**	**r= .54**	NEO	Agreeableness (Global factor)	r= -.35
	E3 Assertiveness	**r= .45**			
16PF	Openness to Change	r= .35	16PF	Rule Conscious	r= -.19
	Dominance	r= .35			
FiroB	**Scale E "I control people"**	**r= .47**	FiroB	Scale G "People control me"	r= -.12
HPI	**Leadership**	**r= .51**	HPI	Impulse Control	r= -.38
	Competitive	**r= .43**			
DISC	**Dominance**	**r= .52**	DISC	**Steadiness**	**r= -.50**
				Compliance	**r= -.44**
HDS	Mischievous	r= .39	HDS	Cautious	r= -.29
MBTI	Extraversion	r= .23	MBTI	Introversion	r= -.23

Table 20.45 Wave Dimension ENTERPRISING

WAVE DIMENSION: ENTERPRISING						
Correlations with Other Assessments: Those high on Wave Styles Enterprising are…						
Likely to be high on…				**Likely to be low on…**		
OPQ	**Competitive**	**r= .54**		OPQ	Caring	r= -.38
	Persuasive	**r= .53**				
NEO	E3 Assertiveness	r= .37		NEO	**Agreeableness (Global factor) r= -.42**	
16PF	**Dominance**	**r= .40**		16PF	Sensitivity	r= -.21
FiroB	**Scale E "I control people"**	**r= .47**		FiroB	Scale G "People control me"	r= -.11
	Scale F "I want to control people"	**r= .41**				
HPI	**Competitive**	**r= .44**		HPI	Impulse Control	r= -.25
DISC	**Dominance**	**r= .47**		DISC	**Steadiness**	**r= -.51**
					Compliance	**r= -.41**
HDS	**Colorful**	**r= .49**		HDS	Cautious	r= -.34
MBTI	Thinking	r= .18		MBTI	Feeling	r= -.18

Table 20.46 Wave Dimension STRIVING

WAVE DIMENSION: STRIVING						
Correlations with Other Assessments: Those high on Wave Styles Striving are…						
Likely to be high on…				**Likely to be low on…**		
OPQ	**Achieving**	**r= .59**		OPQ	Caring	r= -.30
NEO	**C4 Achievement Striving**	**r= .48**		NEO	Agreeableness (Global factor)	r= -.33
16PF	Dominance	r= .24		16PF	Sensitivity	r= -.13
					Apprehension	r= -.13
FiroB	Scale E "I control people "	r= .36		FiroB	Scale G "People control me"	r= -.13
HPI	**Competitive**	**r= .55**		HPI	Impulse Control	r= -.17
DISC	Dominance	r= .38		DISC	Steadiness	r= -.38
HDS	Bold	r= .36		HDS	Cautious	r= -.22
MBTI	Thinking	r= .16		MBTI	Feeling	r= -.16

Summary of Construct Validity

This section describes in-depth analyses, which provide compelling evidence of construct validity for 24 of the Professional Styles dimensions and 24 of the Wave Competency Potentials of the aligned to the 'Great Eight' model, consistently demonstrating average correlations above the .45 criteria between their own 'Great Eights' and those of comparative instruments. Acceptable construct validity was also demonstrated in seven of the remaining twelve Professional Styles dimensions and seven of the twelve Competency Potentials not aligned to the 'Great Eight' model, with correlational analysis of conceptual mapping demonstrating average correlations just short of the >.45 criteria. Five Wave Professional Styles dimensions and five Wave Competency Potentials were deemed constructs unique to Wave. Evidence of their concurrent validity can be found in the criterion-related validity section of this chapter.

Overall, the a priori construct validity evidence provides support for the criterion centric alignment to other personality measures and provides evidence of the convergent and discriminant validity of Wave Professional Styles in assessing behavioral competency and underpinning overall effectiveness.

20.3 Criterion-related Validity

Concurrent Validity: Wave Professional Styles and Job Performance

Standardization Data

For more details on the Standardization sample refer to the Norm and Construction chapters.

Table 20.47 Concurrent Validity of Wave Professional Styles against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=556-658)*

Professional Styles Dimension	Criterion	Criterion Mean	Criterion SD	r	r_c
Analytical	Examining Information	5.08	1.01	.13	.26
Factual	Documenting Facts	5.14	1.02	.17	.29
Rational	Interpreting Data	5.11	1.00	.24	.46
Learning Oriented	Developing Expertise	5.23	1.11	.11	.19
Practically Minded	Adopting Practical Approaches	5.45	.92	-.02	-.04
Insightful	Providing Insights	5.09	1.02	.07	.14
Inventive	Generating Ideas	4.87	1.06	.28	.42
Abstract	Exploring Possibilities	4.92	1.03	.13	.21
Strategic	Developing Strategies	4.58	1.09	.27	.54
Interactive	Interacting with People	5.03	1.16	.21	.42
Engaging	Establishing Rapport	5.39	1.14	.32	.63
Self-promoting	Impressing People	4.61	1.15	.17	.32
Convincing	Convincing People	4.78	1.01	.13	.26
Articulate	Articulating Information	4.90	1.17	.33	.66
Challenging	Challenging Ideas	5.11	1.06	.29	.47
Purposeful	Making Decisions	5.06	1.04	.24	.48
Directing	Directing People	4.77	1.20	.34	.68
Empowering	Empowering Individuals	4.73	1.20	.31	.62
Self-assured	Conveying Self-Confidence	4.88	1.11	.20	.40
Composed	Showing Composure	4.97	1.11	.18	.36
Resolving	Resolving Conflict	4.88	1.06	.19	.38
Positive	Thinking Positively	5.10	1.11	.20	.40
Change Oriented	Embracing Change	5.18	1.08	.21	.42
Receptive	Inviting Feedback	4.76	1.11	.13	.26
Attentive	Understanding People	5.10	1.12	.19	.35
Involving	Team Working	5.20	1.12	.16	.32
Accepting	Valuing Individuals	5.21	1.12	.17	.34
Reliable	Meeting Timescales	5.27	1.18	.34	.45
Meticulous	Checking Things	5.26	1.08	.24	.39
Conforming	Following Procedures	5.46	.95	.17	.26
Organized	Managing Tasks	5.11	1.07	.20	.32
Principled	Upholding Standards	5.89	.96	.13	.21
Activity Oriented	Producing Output	5.33	1.11	.18	.26
Dynamic	Taking Action	5.15	1.06	.27	.54
Enterprising	Seizing Opportunities	4.72	1.15	.26	.42
Striving	Pursuing Goals	5.28	1.03	.14	.28
	Mean	5.07	1.08	.20	.37
	Median	5.10	1.09	.20	.37
	Min	4.58	.92	-.02	-.04
	Max	5.89	1.20	.34	.68

*Sample size varied due to no evidence option on criterion ratings. r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 236 pairs of criterion ratings).

Note: Any raw correlation higher than .09 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .07 is statistically significant at the p<.05 level (one tailed). This is based on statistical significance values for the lowest sample size of N=556 to give a conservative estimate of significance.

Table 20.48 Concurrent Validity of Wave Professional Styles Competency Potential Dimensions against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=500-632)*

Professional Styles Dimension	Criterion	Criterion Mean	Criterion SD	r	r_c
Examining Information	Examining Information	5.08	1.01	.19	.38
Documenting Facts	Documenting Facts	5.14	1.02	.24	.41
Interpreting Data	Interpreting Data	5.11	1.00	.27	.52
Developing Expertise	Developing Expertise	5.23	1.11	.11	.19
Adopting Practical Approaches	Adopting Practical Approaches	5.45	.92	.10	.18
Providing Insights	Providing Insights	5.09	1.02	.17	.34
Generating Ideas	Generating Ideas	4.87	1.06	.32	.48
Exploring Possibilities	Exploring Possibilities	4.92	1.03	.19	.31
Developing Strategies	Developing Strategies	4.58	1.09	.28	.56
Interacting with People	Interacting with People	5.03	1.16	.27	.54
Establishing Rapport	Establishing Rapport	5.39	1.14	.34	.67
Impressing People	Impressing People	4.61	1.15	.25	.46
Convincing People	Convincing People	4.78	1.01	.21	.42
Articulating Information	Articulating Information	4.90	1.17	.40	.80
Challenging Ideas	Challenging Ideas	5.11	1.06	.31	.50
Making Decisions	Making Decisions	5.06	1.04	.31	.62
Directing People	Directing People	4.77	1.20	.36	.72
Empowering Individuals	Empowering Individuals	4.73	1.20	.33	.66
Conveying Self-Confidence	Conveying Self-Confidence	4.88	1.11	.37	.74
Showing Composure	Showing Composure	4.97	1.11	.22	.44
Resolving Conflict	Resolving Conflict	4.88	1.06	.22	.44
Thinking Positively	Thinking Positively	5.10	1.11	.27	.54
Embracing Change	Embracing Change	5.18	1.08	.27	.54
Inviting Feedback	Inviting Feedback	4.76	1.11	.19	.38
Understanding People	Understanding People	5.10	1.12	.22	.40
Team Working	Team Working	5.20	1.12	.23	.46
Valuing Individuals	Valuing Individuals	5.21	1.12	.19	.38
Meeting Timescales	Meeting Timescales	5.27	1.18	.36	.48
Checking Things	Checking Things	5.26	1.08	.24	.39
Following Procedures	Following Procedures	5.46	.95	.22	.33
Managing Tasks	Managing Tasks	5.11	1.07	.27	.43
Upholding Standards	Upholding Standards	5.89	.96	.12	.20
Producing Output	Producing Output	5.33	1.11	.25	.36
Taking Action	Taking Action	5.15	1.06	.28	.56
Seizing Opportunities	Seizing Opportunities	4.72	1.15	.33	.53
Pursuing Goals	Pursuing Goals	5.28	1.03	.21	.42
	Mean	5.07	1.08	.25	.47
	Median	5.10	1.09	.25	.45
	Min	4.58	.92	.10	.18
	Max	5.89	1.20	.40	.80

*Sample size varied due to no evidence option on criterion ratings. r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 236 pairs of criterion ratings). As single item criteria were used – items with inter-rater reliabilities of .25 or less were set to .25 to limit the degree of adjustment. No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .09 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .08 is statistically significant at the p<.05 level (one tailed). This is based on statistical significance values for the lowest sample size of N=500 to give a conservative estimate of significance. Criterion Mean and SD taken from (identical to) Table 20.40.

Project Epsom

Project Epsom is a major research initiative, initiated by the Research and Development team of Saville Consulting. The aim of Project Epsom was to compare the validities of a range of the most popular personality questionnaires currently on the market while attending to some of the problems of current research in this field. One important problem of validity research is that it is difficult to integrate validity data and compare tests on their validity when each study inevitably uses different methodologies, measures against different criteria and uses different samples. In choosing a test to use, practitioners are faced with a vast array of information on the validity of different tests, but how can you compare the usefulness of tests if they are all compared against different criteria? Project Epsom was set up to address these very issues.

All the personality questionnaires used in Project Epsom were validated using the same sample and the same work performance measures. The criteria used to measure the validity of the tools was the externally-developed SHL Great Eight competency framework (Kurz & Bartram, 2002) along with a global performance measure, in order to ensure fairness of comparison and to avoid content bias towards the Saville Consulting questionnaires. The content of the global performance measure originates with the work of Nyfield et al. (1995) and covers three key areas: Applying Specialist Expertise, Accomplishing Objectives and Demonstrating Potential.

Co-validation, such as that carried out in this project, allows for a more meaningful comparison of the validity of different tests on the same criteria and sample.

More information on Project Epsom can be found in:

Saville, P. (2008). *Personality Questionnaires – Valid Inferences, False Prophecies. Presented at the Division of Occupational Psychology of the British Psychological Society Annual Conference, UK, January 2008.*

Saville, P, MacIver, R., Kurz, R. & Hopton, T. (2008). *Project Epsom: How Valid Is Your Questionnaire? Phase 1: A New Comparative Study of the Major Personality Questionnaires in Predicting Job Performance. Saville Consulting Group: Jersey.*

Saville, P, MacIver, R., Kurz, R. & Hopton, T. (2008). *Project Epsom: How Valid Is Your Questionnaire? Management Summary: A New Comparative Study of the Major Personality Questionnaires in Predicting Job Performance. Saville Consulting Group: Jersey.*

Saville, P., MacIver, R., Kurz, R., Staddon, H., Hopton, T., Oxley, H., Mitchener, A., Tonks, K., Schmidt, G., Schmidt, S. & Saville, J. (2009). *A Step Towards Validity Generalization across Self-Report Personality Questionnaires: A Co-Validation of Saville Consulting Wave Professional Styles, Wave Focus Styles, Saville PP, OPQ32i, NEO-PI-R, Hogan Personality Inventory and 16PF5. Paper Presented at the British Psychological Society, Division of Occupational Psychology, Blackpool, UK.*

MacIver, R., Saville, P., Kurz, R., Oxley, H., Feindt, S., Beaujouan, Y-M., McDowall, A. (2009) *Effectiveness at Work: Investigating the Structure and Prediction of Performance Based on a Co-validation of Seven Personality and Three Aptitude Assessments. Symposium presented at European Association of Work and Organizational Psychology Conference, Santiago, Spain.*

Method

A total of 308 participants completed a range of different tests including the Professional Styles and Focus Styles versions of the Saville Consulting Wave® questionnaire, Saville Personality Profile, OPQ®, Hogan Personality Inventory, 16PF5 and NEO-PI-R. The majority also completed a larger range of questionnaires including the Hogan Development Survey, Thomas International DISC, DISCUS, and MBTI assessments. The presentation order of these questionnaires was counterbalanced across participants in order to prevent fatigue and drop out effects. Each participant was asked to nominate two other people who would act as independent "raters" and who evaluated their performance at work.

Saville Personality Profile is a questionnaire developed for Project Epsom. The approach to development was primarily deductive (as was for example the development of OPQ®). It uses the same rate-rank dynamic format as developed for Wave Professional Styles and is composed of motive and talent items, has 36 primary facet scales, but takes less than 15 minutes to complete.

The following section provides information on some of the key findings in Project Epsom related to Wave Professional Styles.

Note: For the sake of simplicity, the decision was taken not to include statistical significance within each table. For the Epsom sample (N=308), any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed).

Project Epsom Data

A sample of employees from a range of business sectors completed Wave Professional Styles and were simultaneously rated by external raters on their job performance. External raters completed a questionnaire asking them to rate the participant on several Work Performance Competencies.

The concurrent validity of the 36 dimensions of Wave Professional Styles against their related job performance criteria can be found in Table 20.49.

Wave's derived Competency Potential 36 scales were also compared to job performance in order to see whether they provide incremental validity on top of the validity of the original 36 Wave Styles scales. These validity coefficients can be found in Table 20.50.

The concurrent validity of the 12 sections of Wave Professional Styles against their related job performance criteria can be found in Table 20.51. Wave's Competency Potential 12 sections were also compared to their related job performance criteria. The validity of the 12 sections of Wave's Competency Potentials scores can be found in Table 20.52.

Raters in Project Epsom

It should be noted that Project Epsom was designed to validate a large number of different assessment instruments in one study. Both the main participants in the study and the raters were paid. Most of the raters were the majority of these being peers.

Do the results here differ from the results achieved for Wave Professional Styles with solely managerial ratings of performance? To investigate this in the standardization study of Wave Professional Styles, 338 managers rated the performance of individuals against a two item composite of performance and potential (which later formed the global effectiveness scales of the BAG model - see Introduction chapter). The same methodology of computing the Great Eight was conducted as with Project Epsom. As with Project Epsom an overall unit weighted composite of the Great Eight scores for Wave Professional Styles was created and correlated with managerial ratings of overall effectiveness based on the performance and potential criterion items. The overall validity of the Wave Styles Competency Potential scores in this solely managerial rating sample is .33 uncorrected which is in line with the Project Epsom overall uncorrected validity in a mixed rater sample. This cross validation provides further support for the enhanced validity of Wave Professional Styles Competency Potential scores in managerial as well as mixed rater samples.

Tables 20.49 and 20.50 display concurrent validities of Wave Styles dimensions are Wave Competency Potential dimensions respectively. Wave Competency Potential dimensions have validities on average 10% higher than Wave Styles dimensions, hence are recommended for use when making decisions in the selection.

Table 20.49 Concurrent Validity of Wave Professional Styles against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=308)

Wave Professional Styles Dimension (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	r_c*
Analytical	Examining Information	5.77	.88	.11	.23
Factual	Documenting Facts	5.57	1.06	.12	.23
Rational	Interpreting Data	5.48	1.04	.10	.20
Learning Oriented	Developing Expertise	5.69	1.04	.12	.24
Practically Minded	Adopting Practical Approaches	5.86	1.00	.18	.36
Insightful	Providing Insights	5.62	1.01	.12	.24
Inventive	Generating Ideas	5.33	1.02	.21	.43
Abstract	Exploring Possibilities	5.15	1.07	.06	.12
Strategic	Developing Strategies	5.06	1.14	.21	.43
Interactive	Interacting with People	5.94	1.11	.27	.48
Engaging	Establishing Rapport	6.03	1.09	.30	.52
Self-promoting	Impressing People	5.26	1.36	.17	.34
Convincing	Convincing People	5.32	1.03	.17	.34
Articulate	Articulating Information	5.32	1.24	.34	.59
Challenging	Challenging Ideas	5.46	1.11	.24	.49
Purposeful	Making Decisions	5.55	1.05	.21	.41
Directing	Directing People	5.25	1.22	.29	.52
Empowering	Empowering Individuals	5.40	1.20	.22	.40
Self-assured	Conveying Self-Confidence	5.30	1.22	.25	.49
Composed	Showing Composure	5.19	1.41	.14	.27
Resolving	Resolving Conflict	5.27	1.20	.16	.31
Positive	Thinking Positively	5.48	1.17	.19	.33
Change Oriented	Embracing Change	5.42	1.06	.22	.43
Receptive	Inviting Feedback	5.11	1.25	.06	.11
Attentive	Understanding People	5.72	1.16	.24	.49
Involving	Team Working	5.69	1.09	.12	.23
Accepting	Valuing Individuals	5.71	1.03	.15	.27
Reliable	Meeting Timescales	5.81	1.19	.26	.49
Meticulous	Checking Things	5.76	1.01	.20	.37
Conforming	Following Procedures	5.62	1.15	.30	.59
Organized	Managing Tasks	5.73	1.03	.19	.38
Principled	Upholding Standards	6.05	.94	.16	.32
Activity Oriented	Producing Output	5.92	.98	.33	.66
Dynamic	Taking Action	5.63	1.00	.23	.45
Enterprising	Seizing Opportunities	4.91	1.29	.31	.62
Striving	Pursuing Goals	5.63	1.02	.26	.51
	Mean	5.53	1.11	.20	.38
	Median	5.55	1.09	.20	.38
	Min	4.91	.88	.06	.11
	Max	6.05	1.41	.34	.66

* r is the unadjusted validity coefficient. rc validities have been corrected for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). As single item criteria were used – items with inter-rater reliabilities of .25 or less were set to .25 to limit the degree of adjustment. No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308

Table 20.50 Concurrent Validity of Wave derived Competency Potential scores (36 Dimension level) against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. *(N=308)*

Wave Competency Potential (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	rc*
Examining Information	Examining Information	5.77	.88	.17	.34
Documenting Facts	Documenting Facts	5.57	1.06	.19	.38
Interpreting Data	Interpreting Data	5.48	1.04	.13	.26
Developing Expertise	Developing Expertise	5.69	1.04	.08	.15
Adopting Practical Approaches	Adopting Practical Approaches	5.86	1.00	.23	.45
Providing Insights	Providing Insights	5.62	1.01	.22	.44
Generating Ideas	Generating Ideas	5.33	1.02	.21	.43
Exploring Possibilities	Exploring Possibilities	5.15	1.07	.08	.16
Developing Strategies	Developing Strategies	5.06	1.14	.22	.44
Interacting with People	Interacting with People	5.94	1.11	.30	.53
Establishing Rapport	Establishing Rapport	6.03	1.09	.28	.49
Impressing People	Impressing People	5.26	1.36	.21	.41
Convincing People	Convincing People	5.32	1.03	.22	.44
Articulating Information	Articulating Information	5.32	1.24	.38	.67
Challenging Ideas	Challenging Ideas	5.46	1.11	.26	.52
Making Decisions	Making Decisions	5.55	1.05	.23	.46
Directing People	Directing People	5.25	1.22	.31	.56
Empowering Individuals	Empowering Individuals	5.40	1.20	.24	.43
Conveying Self-Confidence	Conveying Self-Confidence	5.30	1.22	.27	.55
Showing Composure	Showing Composure	5.19	1.41	.17	.33
Resolving Conflict	Resolving Conflict	5.27	1.20	.20	.39
Thinking Positively	Thinking Positively	5.48	1.17	.21	.38
Embracing Change	Embracing Change	5.42	1.06	.25	.51
Inviting Feedback	Inviting Feedback	5.11	1.25	.09	.17
Understanding People	Understanding People	5.72	1.16	.27	.53
Team Working	Team Working	5.69	1.09	.15	.31
Valuing Individuals	Valuing Individuals	5.71	1.03	.15	.28
Meeting Timescales	Meeting Timescales	5.81	1.19	.27	.52
Checking Things	Checking Things	5.76	1.01	.19	.34
Following Procedures	Following Procedures	5.62	1.15	.30	.61
Managing Tasks	Managing Tasks	5.73	1.03	.23	.46
Upholding Standards	Upholding Standards	6.05	.94	.16	.32
Producing Output	Producing Output	5.92	.98	.35	.70
Taking Action	Taking Action	5.63	1.00	.27	.54
Seizing Opportunities	Seizing Opportunities	4.91	1.29	.32	.64
Pursuing Goals	Pursuing Goals	5.63	1.02	.27	.53
	Mean	5.53	1.11	.22	.43
	Median	5.55	1.09	.22	.44
	Min	4.91	.88	.08	.15
	Max	6.05	1.41	.38	.70

*r is the uncorrected validity coefficient. rc validities have been corrected for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). As single item criteria were used – items with inter-rater reliabilities of .25 or less were set to .25 to limit the degree of adjustment. No further corrections were applied (e.g., restriction of range, predictor unreliability). Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N = 308. Please note: Names for both criterion and predictor scales are the same as they reflect the Saville Consulting aligned model of Work Performance. Work Performance Competencies (criteria) are external ratings of an individual's performance on the competencies listed. Wave Competency Potentials (predictors) are self-report measures of a person's potential on that competency. Competency Potential scores are generated from participants' self-report scores on Wave Styles questionnaires.

Table 20.51 Concurrent Validity of Wave Professional Styles 12 Sections against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=308)

Wave Professional Styles Section (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	r_c*
Evaluative	Evaluating Problems	16.82	2.49	.06	**.13**
Investigative	Investigating Issues	17.18	2.45	.15	**.32**
Imaginative	Creating Innovation	15.54	2.64	.19	**.43**
Sociable	Building Relationships	17.24	2.92	.26	**.46**
Impactful	Communicating Information	16.10	2.63	.32	**.61**
Assertive	Providing Leadership	16.20	2.80	.28	**.49**
Resilient	Showing Resilience	15.76	2.93	.17	**.31**
Flexible	Adjusting to Change	16.01	2.81	.16	**.34**
Supportive	Giving Support	17.12	2.78	.20	**.37**
Conscientious	Processing Details	17.19	2.74	.27	**.48**
Structured	Structuring Tasks	17.69	2.31	.30	**.70**
Driven	Driving Success	16.17	2.71	.32	**.60**
	Mean	16.59	2.68	.22	**.44**
	Median	16.51	2.73	.23	**.45**
	Min	15.54	2.31	.06	**.13**
	Max	17.69	2.93	.32	**.70**

*r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308.

Table 20.52 Concurrent Validity of Wave derived Competency Potential scores (12 Section level) against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=308)

Professional Styles Competency Potential (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	r_c*
Evaluating Problems	Evaluating Problems	16.82	2.49	.12	**.26**
Investigating Issues	Investigating Issues	17.18	2.45	.20	**.42**
Creating Innovation	Creating Innovation	15.54	2.64	.20	**.46**
Building Relationships	Building Relationships	17.24	2.92	.29	**.51**
Communicating Information	Communicating Information	16.10	2.63	.35	**.67**
Providing Leadership	Providing Leadership	16.20	2.80	.30	**.53**
Showing Resilience	Showing Resilience	15.76	2.93	.20	**.37**
Adjusting to Change	Adjusting to Change	16.01	2.81	.22	**.46**
Giving Support	Giving Support	17.12	2.78	.21	**.38**
Processing Details	Processing Details	17.19	2.74	.26	**.47**
Structuring Tasks	Structuring Tasks	17.69	2.31	.32	**.74**
Driving Success	Driving Success	16.17	2.71	.35	**.65**
	Mean	16.59	2.68	.25	**.49**
	Median	16.51	2.73	.24	**.47**
	Min	15.54	2.31	.12	**.26**
	Max	17.69	2.93	.35	**.74**

*r is the uncorrected validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308.

Tables 20.51 and 20.52 display concurrent validities of Wave Styles and Wave Competency Potentials at the section level. Again, the validities of Wave Competency Potentials are on average 10% higher than those of Wave Styles, providing further evidence for their use in selection decision making.

Concurrent Validity: Wave and other Personality Assessments

Project Epsom Data

The major co-validation study carried out by Saville Consulting ("Project Epsom") measured participants on a range of personality assessments, as well as collecting independent ratings of these individuals' job performance. This section is concerned with the concurrent, criterion-related validity of a number of these personality tools – looking at how well they relate to independent criterion measures of job performance.

As a primary development goal of Wave Professional Styles was to maximize validity in order to better forecast performance at work, the outcome of this study was of fundamental importance to Wave achieving its design goals.

The seven personality assessments used in this study were; Wave Professional Styles, Wave Focus Styles, Saville Personality Profile, OPQ32i, NEO-PI-R, Hogan Personality Inventory (HPI) and 16PF-5.

The tables below show the comparative validities of the seven personality assessments across a number of different criterion measures.

Measuring Global Overall Work Performance

Saville Consulting's Wave Performance Culture Framework consists of the BAG – Behavior, Ability and Global. Global Overall Effectiveness at work is measured by three sub-components: 'Applying Specialist Expertise,' 'Accomplishing Objectives' and 'Demonstrating Potential.' 'Overall Total Performance' consists of the sum of the three sub-components.

Individuals in this study were rated on the Overall Performance measures by external raters. The raw validity coefficients for each of the seven measures included in the study are shown in Table 20.54. To allow for the unreliability of criterion ratings, validity coefficients can be adjusted for 'criterion unreliability.' The adjusted validity coefficients are shown in Table 20.55. Both the raw and adjusted validity co-efficients are included here for comparison.

Creation of Overall Score from Each Personality Assessment

The 'Great Eight' model is a criterion-centric model of work performance developed by Kurz and Bartram (Kurz and Bartram, 2002). The 'Great Eight' are eight broad competency factors which reflect psychological constructs relating to effective work performance. The eight competencies are:

- Analyzing & Interpreting
- Creating & Conceptualizing
- Interacting & Presenting
- Leading & Deciding
- Supporting & Cooperating
- Adapting & Coping
- Organizing & Executing
- Enterprising & Performing

In order to compare personality assessments on the Great Eight competencies, composite 'Great Eight Predictor' scales were created. These were aggregated with unit weights to provide an overall score from each personality assessment.

Table 20.53 shows the *a priori* conceptual mapping of the personality assessments to the 'Great Eight' work performance competencies by subject matter experts.

Table 20.53 Conceptual Mapping of the 'Great Eight' Competencies against Wave Professional Styles 'and other assessments' scales.

Great 8 Criteria	Wave Competency Potential (CP) Dimensions	Wave Professional Styles (S) Dimensions	Wave Focus Styles (S) Facets	Saville PP	OPQ32i	NEO-PI-R	HPI (HICS)	16PF5
Analyzing & Interpreting	• Examining Information • Exploring Possibilities • Interpreting Data	• Analytical • Abstract • Rational	• Information Analysis • Conceptual • Data Oriented	• Analytical • Theoretical • Data-Driven	• Evaluative • Conceptual • Data Rational	• Openness to Ideas • Compliance • Openness to Feelings (-)	• Math Ability • Education • Science Ability	• B (Intellect) • M (Abstractedness) • Q2 (Self-Reliance)
Creating & Conceptualizing	• Generating Ideas • Developing Strategies • Providing Insights	• Inventive • Strategic • Insightful	• Creative • Strategic • Focused on Improving Things	• Creative • Unconventional • Independent	• Innovative • Conventional (-) • Independent Minded	• Openness to Actions • Openness to Aesthetics • Openness to Values	• Experience Seeking • Culture • Generating Ideas	• Q1 (Openness to Change) • M (Abstractedness) • G (Rule Consciousness) (-)
Interacting & Presenting	• Articulating Information • Interacting with People • Impressing People	• Articulate • Interactive • Self-promoting	• Presentation Oriented • Lively • Attention Seeking	• Assured • Extrovert • Unreserved	• Socially Confident • Outgoing • Modest (-)	• Gregariousness • Warmth • Positive Emotions	• Like Parties • Entertaining • Exhibitionist	• H (Social Boldness) • F (Liveliness) • N (Privateness) (-)
Leading & Deciding	• Directing People • Empowering Individuals • Making Decisions	• Directing • Empowering • Purposeful	• Leadership Oriented • Motivating • Responsibility Seeking	• Leading • Sales-Oriented • Decisive	• Controlling • Persuasive • Decisive	• Assertiveness • Modesty (-) • Competence	• Leadership • No Social Anxiety • Even Tempered	• E (Dominance) • H (Social Boldness) • O (Apprehension) (-)
Supporting & Cooperating	• Understanding People • Team Working • Establishing Rapport	• Attentive • Involving • Engaging	• Empathic • Team Oriented • Rapport Focused	• Considerate • Consultative • Friendship Oriented	• Caring • Democratic • Affiliative	• Altruism • Tender-Mindedness • Trust	• Sensitive • Trusting • Virtuous	• A (Warmth) • L (Vigilance) (-) • Q2 (Self-Reliance) (-)
Adapting & Coping	• Showing Composure • Conveying Self-Confidence • Thinking Positively	• Composed • Self-assured • Positive	• Relaxed at Events • Self-Confidence • Optimistic	• Tough Minded • Laid-back • Optimistic	• Tough Minded • Relaxed • Optimistic	• Vulnerability (-) • Anxiety (-) • Depression (-)	• Not Anxious • Empathy • Identity	• O (Apprehension) (-) • C (Emotional Stability) • Q4 (Tension) (-)
Organizing & Executing	• Checking Things • Meeting Time scales • Taking Action	• Meticulous • Reliable • Dynamic	• Detail Focused • Deadline Focused • Action Oriented	• Completion Oriented • Detailed • Planful	• Conscientious • Detail Conscious • Forward Thinking	• Order • Deliberation • Dutifulness	• Impulse Control • Avoids Trouble • Mastery	• G (Rule-consciousness) • Q3 (Perfectionism) • M (Abstractedness) (-)
Enterprising & Performing	• Pursuing Goals • Producing Output • Seizing Opportunities	• Striving • Activity Oriented • Enterprising	• Results Oriented • Quick Working • Business Opportunity Oriented	• Ambitious • Vigorous • Competitive	• Achieving • Vigorous • Competitive	• Achievement Striving • Self-Discipline • Activity	• Self Confidence • Competitive • Curiosity	• Q3 (Perfectionism) • E (Dominance) • I (Sensitivity) (-)

More information on the process for creating these overall scores can be found in Saville 2009.

Table 20.54 Concurrent validity of seven personality assessments against ratings of Global Overall Performance, unadjusted for criterion unreliability. (N=308)

Personality Assessment	Applying Specialist Expertise	Accomplishing Objectives	Demonstrating Potential	Overall Total Performance	Overall Total Performance (Excl. Expertise)
Wave Professional Styles Competency Potentials	**.15**	**.24**	**.34**	**.32**	**.34**
Wave Professional Styles	**.12**	**.21**	**.30**	**.28**	**.30**
Wave Focus Styles Competency Potentials	.15	.15	.26	**.25**	.25
Wave Focus Styles	.13	.11	.24	**.21**	.22
Saville PP	.06	.12	.23	**.19**	.21
OPQ32i	.08	.11	.19	**.17**	.18
NEO-PI-R	.13	.16	.17	**.20**	.20
Hogan Personality Inventory (HPI)	.13	.11	.17	**.18**	.17
16PF-5	.04	.19	.18	**.18**	.21

These validities are unadjusted for any statistical artifacts.

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308.
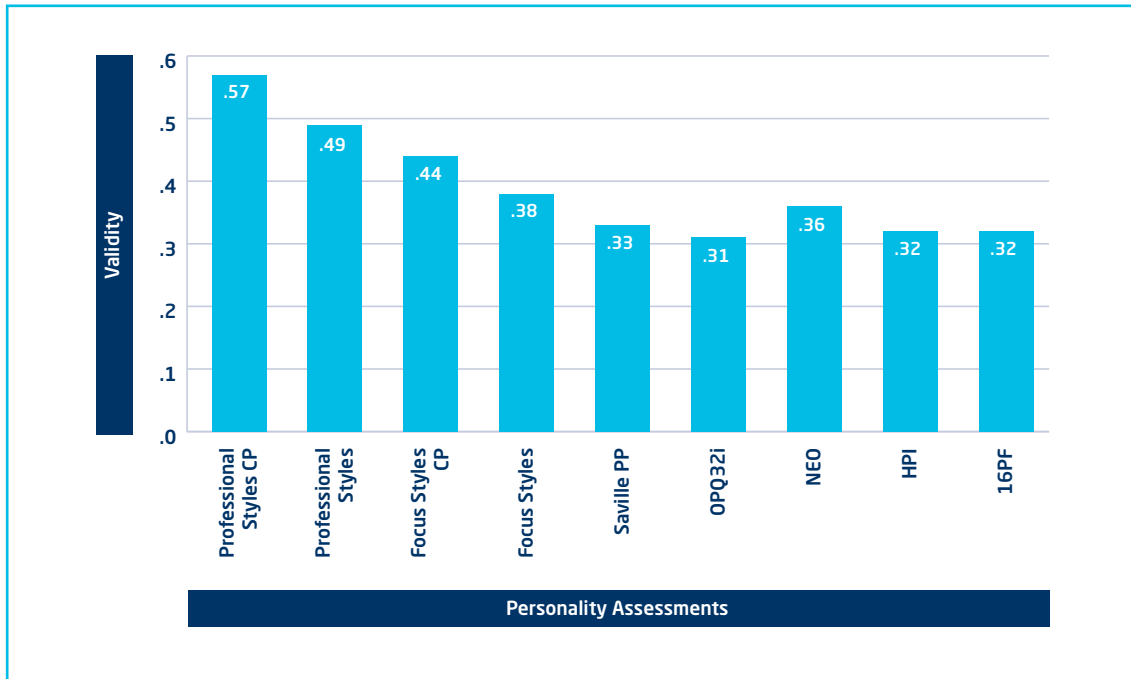
Table 20.55 Concurrent validity of seven personality assessments against ratings of Global Overall Performance, adjusted for criterion unreliability. (N=308)

Personality Assessment	Applying Specialist Expertise	Accomplishing Objectives	Demonstrating Potential	Overall Total Performance	Overall Total Performance (Excl. Expertise)
Wave Professional Styles Competency Potentials	**.33**	**.50**	**.54**	**.57**	**.58**
Wave Professional Styles	**.25**	**.46**	**.48**	**.49**	**.52**
Wave Focus Styles Competency Potentials	.33	.32	.42	**.44**	**.42**
Wave Focus Styles	.28	.24	.38	**.38**	**.37**
Saville PP	.14	.26	.36	**.33**	**.36**
OPQ32i	.17	.24	.31	**.31**	**.31**
NEO-PI-R	.29	.34	.28	**.36**	**.33**
Hogan Personality Inventory (HPI)	.29	.23	.27	**.32**	**.28**
16PF-5	.10	.40	.29	**.32**	**.36**

Validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Tables 20.54 and 20.55 show the validity of Wave Competency Potentials against Overall Total Performance, which is statistically significantly higher than all non-performance driven, non-validation centric tools (Saville PP, NEO, OPQ, HPI and 16PF). Graphs 20.1 and 20.2 provide a graphical representation of the validity and power of Wave and other instruments.

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Graph 20.1 Average (mean) validity of personality assessments against independent ratings of Overall Total Performance, adjusted for criterion unreliability. *(N=308)*

CP stands for Competency Potential, N=308.

Graph 20.2 Average Power of personality assessments against independent ratings of Overall Total Performance, adjusted for criterion unreliability. *(N=308)*
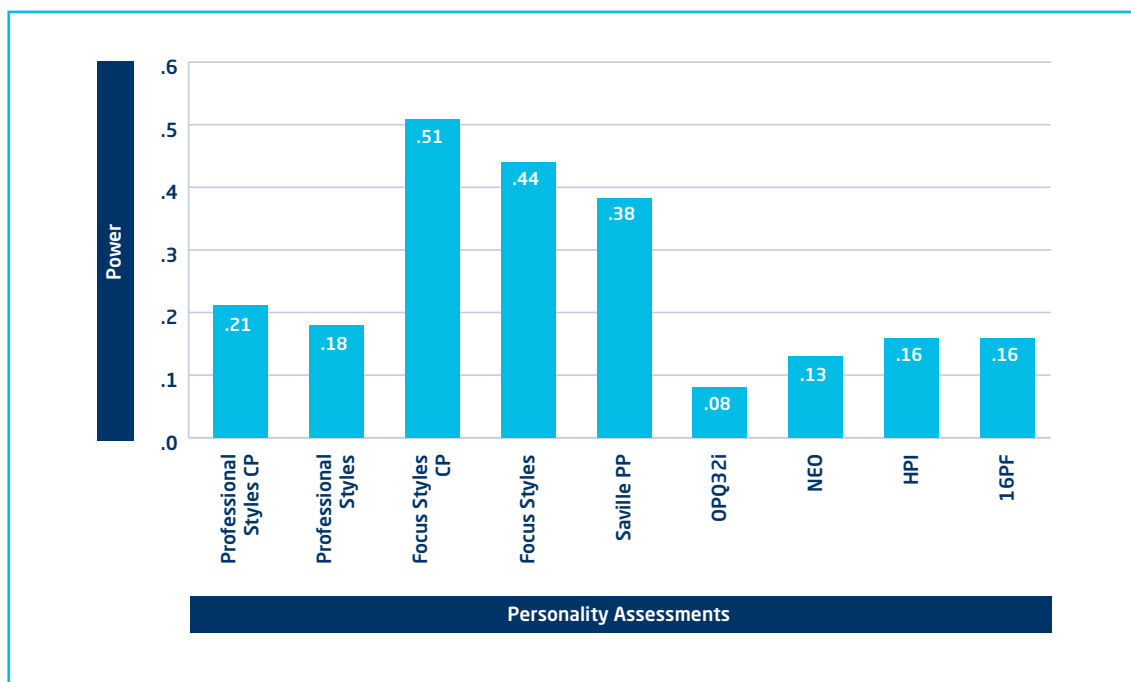
Power is calculated as validity per 15 minutes.
CP stands for Competency Potential, N=308.

Measuring Work Performance Competencies – The Great Eight

The personality assessments included in this validation study were; Wave Professional Styles, Wave Focus Styles, OPQ32i, NEO-PI-R, Hogan Personality Inventory (HPI) and 16PF-5. Individuals were rated on the 'Great Eight' competencies by external raters.

Table 20.56 Concurrent validity of personality assessments against ratings on the 'Great Eight' work performance competencies, unadjusted for criterion unreliability. (N=308)

	Work Performance Competency (Criterion) 'Great Eight' Criteria											
	Analyzing & Interpreting	**Creating & Conceptualizing**	**Interacting & Presenting**	**Leading & Deciding**	**Supporting & Cooperating**	**Adapting & Coping**	**Organizing & Executing**	**Enterprising & Performing**	**Mean**	**Median**	**Min**	**Max**
Wave Professional Styles Competency Potentials	.09	.20	.33	.30	.09	.22	.22	.34	**.22**	.22	.09	.34
Wave Professional Styles	.06	.18	.28	.29	.10	.18	.21	.31	**.20**	.20	.06	.31
Wave Focus Styles Competency Potentials	.10	.18	.31	.25	.12	.19	.18	.28	**.20**	.19	.10	.31
Wave Focus Styles	.06	.16	.26	.24	.15	.15	.16	.24	**.18**	.16	.06	.26
Saville PP	.06	.11	.25	.31	.14	.12	.15	.30	**.18**	.15	.06	.31
OPQ32i	.10	.12	.18	.28	.13	.12	.16	.23	**.17**	.15	.10	.28
NEO	.06	.03	.22	.33	.14	.20	.16	.26	**.18**	.18	.03	.33
HPI	.16	.10	.16	.28	.06	.12	.09	.20	**.15**	.14	.06	.28
16PF	.10	.04	.22	.27	.08	.14	.09	.13	**.13**	.12	.04	.27

These validities are unadjusted for any statistical artifacts.

Note: Any raw correlation higher than .12 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .10 is statistically significant at the p<.05 level (one tailed). N=308.

Table 20.56 provides evidence to support the prediction of Great Eight competencies with six out of eight areas of Wave Competency Potential reaching significance. All eight areas reach significance in one or other Wave instruments. The rank order of the average validity runs from Wave Professional Styles Competency Potentials followed by Wave Focus Styles, Saville PP and NEO with the lowest averages for OPQ, HPI and 16PF in forecasting the Great Eight.
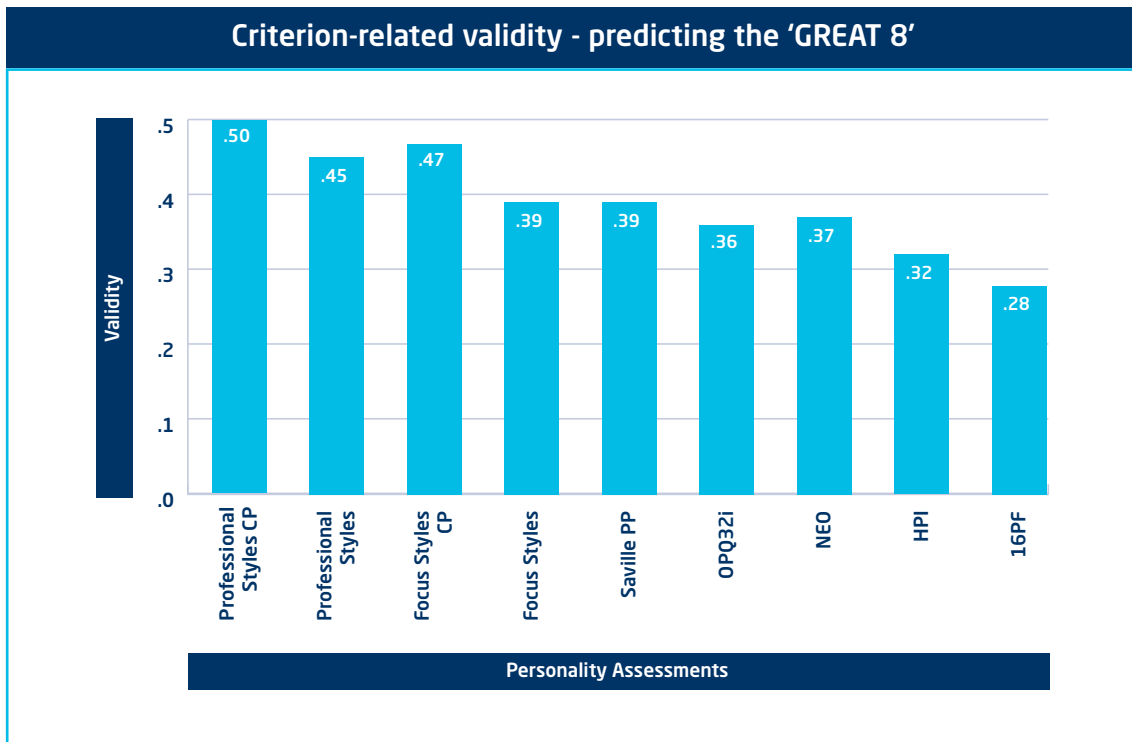
Table 20.57 Concurrent validity of personality assessments against ratings on the 'Great Eight' work performance competencies, adjusted for criterion unreliability.
(N=308)

	Work Performance Competency (Criterion) 'Great Eight' Criteria											
	Analyzing & Interpreting	Creating & Conceptualizing	Interacting & Presenting	Leading & Deciding	Supporting & Cooperating	Adapting & Coping	Organizing & Executing	Enterprising & Performing	Mean	Median	Min	Max
Wave Professional Styles Competency Potentials	.20	.61	.69	.55	.21	.46	.51	.76	.50	.53	.20	.76
Wave Professional Styles	.13	.55	.59	.54	.22	.39	.49	.69	.45	.52	.13	.69
Wave Focus Styles Competency Potentials	.25	.61	.65	.47	.26	.42	.45	.65	.47	.46	.25	.65
Wave Focus Styles	.12	.48	.55	.45	.34	.32	.37	.53	.39	.41	.12	.55
Saville PP	.13	.34	.53	.58	.31	.25	.35	.66	.39	.35	.13	.66
OPQ32i	.22	.37	.38	.52	.29	.25	.37	.51	.36	.37	.22	.52
NEO	.13	.09	.46	.61	.31	.42	.37	.57	.37	.40	.09	.61
HPI	.35	.31	.34	.52	.13	.25	.21	.44	.32	.32	.13	.52
16PF	.22	.12	.46	.50	.18	.30	.21	.29	.28	.25	.12	.50

Validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Graph 20.3 Average (mean) concurrent validity of personality assessments based on external ratings of 'Great Eight' work performance criteria, adjusted for criterion unreliability. *(N=308)*

Criterion-related validity - predicting the 'GREAT 8'

Personality Assessment	Validity
Professional Styles CP	.50
Professional Styles	.45
Focus Styles CP	.47
Focus Styles	.39
Saville PP	.39
OPQ32i	.36
NEO	.37
HPI	.32
16PF	.28

Validity (y-axis), Personality Assessments (x-axis)

CP stands for Competency Potential. N=308.

20.4 Predictive Validity

Predictive Validity: Wave Professional Styles and Job Performance

In order to assess predictive validity of Wave Professional Styles, a criterion measure must be completed at a later point in time than the predictor measure. In this study, 108 participants completed Wave Professional Styles at Time 1 and at Time 2, six months later, were rated on their work performance by external raters. For the rating task, external raters completed the 'Wave Performance 360' questionnaire, a tool for assessing an individual's job performance across a number of work domains.

The predictive validity of the 12 sections of Wave Professional Styles against their related job performance criteria can be seen in Table 20.51. Wave's Competency Potential 12 sections were also compared to their related job performance criteria. The predictive validity of the 12 sections of Wave's Competency Potentials scores can be found in Table 20.52.

Table 20.58 Predictive validity of Wave Professional Styles 12 Sections against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=108)

Professional Styles Section (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	r_c*
Evaluative	Evaluating Problems	16.62	2.74	.05	.11
Investigative	Investigating Issues	16.79	2.64	.11	.23
Imaginative	Creating Innovation	15.56	2.91	.12	.26
Sociable	Building Relationships	16.89	2.79	.28	.50
Impactful	Communicating Information	15.98	2.82	.28	.54
Assertive	Providing Leadership	16.14	2.83	.14	.25
Resilient	Showing Resilience	15.66	2.96	.19	.34
Flexible	Adjusting to Change	15.71	2.89	.17	.36
Supportive	Giving Support	16.61	2.89	.12	.22
Conscientious	Processing Details	17.03	2.77	.20	.35
Structured	Structuring Tasks	17.53	2.24	.16	.38
Driven	Driving Success	16.36	2.51	.17	.31
	Mean	16.41	2.75	.17	.32
	Median	16.49	2.81	.17	.33
	Min	15.56	2.24	.05	.11
	Max	17.53	2.96	.28	.54

*r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .19 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .16 is statistically significant at the p<.05 level (one tailed). N=108.

Table 20.59 Predictive validity of Wave derived Competency Potential scores (12 Section level) against independent criteria (external ratings of work performance competencies), both unadjusted and adjusted for criterion unreliability. (N=108)

Professional Styles Section (Predictor)	Work Performance Competency (Criterion)	Criterion Mean	Criterion SD	r	r_c*
Evaluating Problems	Evaluating Problems	16.62	2.74	.10	.22
Investigating Issues	Investigating Issues	16.79	2.64	.05	.10
Creating Innovation	Creating Innovation	15.56	2.91	.11	.24
Building Relationships	Building Relationships	16.89	2.79	.30	.53
Communicating Information	Communicating Information	15.98	2.82	.26	.50
Providing Leadership	Providing Leadership	16.14	2.83	.12	.20
Showing Resilience	Showing Resilience	15.66	2.96	.24	.42
Adjusting to Change	Adjusting to Change	15.71	2.89	.18	.38
Giving Support	Giving Support	16.61	2.89	.15	.28
Processing Details	Processing Details	17.03	2.77	.20	.35
Structuring Tasks	Structuring Tasks	17.53	2.24	.21	.49
Driving Success	Driving Success	16.36	2.51	.18	.34
	Mean	16.41	2.75	.17	.34
	Median	16.49	2.81	.18	.35
	Min	15.56	2.24	.05	.10
	Max	17.53	2.96	.30	.53

*r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability).

Note: Any raw correlation higher than .19 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .16 is statistically significant at the p<.05 level (one tailed). N=108.

Table 20.59 provides further support for Wave Professional Styles in the form of predictive validity. As only a restricted subset (N=108) was available predictive validity analysis was conducted at the section level due to fewer degrees of freedom.

20.5 US Validity Data

Table 20.60 Concurrent validity of Wave Professional Styles 36 Dimensions against 36 level Job Performance criteria, both unadjusted and adjusted for criterion unreliability. *(N=399)*

Wave Professional Styles Dimension	Work Performance Competency (Criterion)	r	r_c*
Analytical	Examining Information	.16	.32
Factual	Documenting Facts	.13	.26
Rational	Interpreting Data	.27	.54
Learning Oriented	Developing Expertise	.12	.24
Practically Minded	Adopting Practical Approaches	-.01	-.02
Insightful	Providing Insights	.16	.32
Inventive	Generating Ideas	.26	.52
Abstract	Exploring Possibilities	.18	.36
Strategic	Developing Strategies	.19	.38
Interactive	Interacting with People	.14	.25
Engaging	Establishing Rapport	.20	.35
Self-promoting	Impressing People	.13	.26
Convincing	Convincing People	.05	.10
Articulate	Articulating Information	.11	.19
Challenging	Challenging Ideas	.17	.34
Purposeful	Making Decisions	.09	.18
Directing	Directing People	.18	.32
Empowering	Empowering Individuals	.17	.31
Self-assured	Conveying Self-Confidence	.04	.08
Composed	Showing Composure	.19	.36
Resolving	Resolving Conflict	.16	.31
Positive	Thinking Positively	.25	.45
Change Oriented	Embracing Change	.24	.48
Receptive	Inviting Feedback	.12	.24
Attentive	Understanding People	.15	.30
Involving	Team Working	.18	.36
Accepting	Valuing Individuals	.24	.45
Reliable	Meeting Timescales	.25	.48
Meticulous	Checking Things	.21	.38
Conforming	Following Procedures	.16	.32
Organized	Managing Tasks	.26	.52
Principled	Upholding Standards	.02	.04
Activity Oriented	Producing Output	.16	.32
Dynamic	Taking Action	.18	.36
Enterprising	Seizing Opportunities	.19	.38
Striving	Pursuing Goals	.15	.30
	Mean	.16	.32
	Median	.17	.32
	Min	.01	-.02
	Max	.27	.54

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r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). As single item criteria were used – items with inter-rater reliabilities of .25 or less were set to .25 to limit the degree of adjustment. No further corrections were applied (e.g., restriction of range, predictor unreliability). Note: Any raw correlation higher than .10 is statistically significant at the p<.05 level (two tailed) and any raw correlation higher than .09 is statistically significant at the p<.05 level (one tailed).

Results based on 2008 validation study conducted in the United States with 399 study participants from the United States and Canada. Behavioral ratings were collected from a mixed group of managers, peers and colleagues.

20.6 Mexican Validity Data

Table 20.61 Concurrent validity of Wave Professional Styles 12 Sections against 12 level Job Performance criteria, both unadjusted and adjusted for criterion unreliability. (N=120)

Professional Styles Section (Predictor)	Work Performance Competency (Criterion)	r	r_c*
Evaluative	Evaluating Problems	.20	.42
Investigative	Investigating Issues	.07	.15
Imaginative	Creating Innovation	.29	.65
Sociable	Building Relationships	-.01	-.02
Impactful	Communicating Information	.06	.11
Assertive	Providing Leadership	.16	.28
Resilient	Showing Resilience	-.05	-.09
Flexible	Adjusting to Change	.01	.02
Supportive	Giving Support	.19	.35
Conscientious	Processing Details	.23	.41
Structured	Structuring Tasks	.23	.54
Driven	Driving Success	-.04	-.07
	Mean	.11	.23
	Median	.12	.21
	Min	-.05	-.09
	Max	.29	.65

r is the unadjusted validity coefficient. r_c validities have been adjusted for attenuation based on the reliability of the criteria (based on 263 pairs of criterion ratings). No further corrections were applied (e.g., restriction of range, predictor unreliability. Behavioral ratings were collected from a mixed group of managers, peers and colleagues. N=120.

Note: Any raw correlation higher than .18 is statistically significant at the $p<.05$ level (two tailed) and any raw correlation higher than .16 is statistically significant at the $p<.05$ level (one tailed).

Tables 20.60 and 20.61 provide further evidence of the concurrent validity of Wave Professional Styles in US and Mexican samples respectively. Again, due to a smaller sample of Mexican data (only a subset was available), here analysis was conducted at the section level due to fewer degrees of freedom.

20.7 Criterion-Related Validity of Facet Scales

Concurrent validity of two item scales against their respective criteria averaged .28 if corrected for inter-rater reliability (.16 uncorrected) (N=500-632) at standardization. This compares to average corrected validity for the 36 broader styles dimensions (with six items) of .37 at standardization. This indicates that the main unit of analysis at the dimension level or higher is generally appropriate, although facet scales in and of themselves have acceptable criterion related validity (although they have more validity in combination as higher order dimensions).

Better average validity of facet scales has been achieved by selecting most valid facets and cross validating – Wave Focus Styles. Further technical information on Wave Focus can be found in the Saville Consulting Wave Focus Styles Handbook.

20.8 Validity Summary

This chapter advances a perspective on validation that emphasizes the importance of a criterion centric model of work performance which focuses on the effective forecasting of both individuals' overall effectiveness at work and behavioral effectiveness in terms of individual work competencies.

The chapter focuses first on the construct validity of Wave Professional Styles scores at dimension level. A central component of the construct validity section provides users of both Wave and other tools with a summary of how Wave Professional Styles relates to other measures of personality or style. This is supported by the correlation matrices in the appendices. Both the tables in the chapter against each Wave Styles dimension and the matrices are designed to aid users by allowing them to easily identify which dimensions of Wave Professional Styles directly relate (bivariate correlation) to other measures and which are unique to Wave (or unique to other measures).

In terms of Wave Professional Styles some dimensions such as Inventive, Interactive, Engaging, Convincing, Articulate, Directing, Conforming, Organized and Enterprising are frequently identified as having similar, related constructs in other measures i.e., they have clear scale counterparts in other questionnaires (correlations stronger than .40 or -.40). Some other dimensions of Wave Professional Styles such as Learning Oriented, Abstract, Strategic, Self-assured, Change Oriented, Activity Oriented and Striving more rarely have direct measures in scales of other tools. The scales of Factual, Practically Minded, Insightful, Empowering, Resolving, Receptive and Principled do not have direct scale counterparts in the other measures.

Wave Professional Styles was developed with the intention of increasing the validity of the assessments by writing questions or items based on a clear model of effectiveness in both behavioral and overall terms. The items were written with a view to predicting the behavioral components of effectiveness (competencies). Items were selected on the basis of their correlations with external ratings of overall measures of effectiveness as well as external ratings of behavioral effectiveness (work competencies). The use of both the criterion centric perspective and this performance driven methodology to select items was also supplemented by the use of the initial validation data to derive competency potential

equations which were designed to maximize the prediction of the behavioral criterion model. Through this method Wave Professional Styles has been designed to maximize criterion related validity both in predicting overall effectiveness and individual behavioral effectiveness (competencies). The expectation was also that the criterion validity would generalize beyond the Wave criterion model to other competency criterion models such as the Great Eight (Bartram (2005)).

Wave has been specifically designed to align to and forecast the Behavior components of the BAG (Behavior, Ability and Global) Wave Performance Culture Framework and to forecast overall effectiveness (Global criteria). This allows the users of Wave Professional Styles a clear picture of what each scale is designed to forecast effectively, allowing them to receive a clearer picture of the validity of the tool and allow them to make better decisions. The clarity of this model also provides clear *a priori* hypotheses to be tested/validated and cross validated.

The criterion related validity evidence presented in this chapter clearly supports the criterion-related validity of Wave Professional Styles and Competency Potential scores, both in measuring independent ratings of behavioral effectiveness and overall measures of effectiveness at work.

We refer to validity in a model being saturated if all the scales in the questionnaire show meaningful correlations with the performance criteria that they have been designed to predict (i.e., meaningful could for example be seen as statistically significant (non zero) correlations which when corrected for criterion unreliability are in the region of .20 and upwards)*.

The Wave Professional Styles scales show saturation across different validation studies at the dimension level. While a scale, such as Practically Minded, may not correlate positively with the respective aligned criterion in one validation study, it does in another.

After demonstrating that a model is saturated, we can then consider the overall validity of a questionnaire and secondly, how it compares to other questionnaires.

The original standardization provided evidence of Wave Professional Styles criterion related validity against overall performance and individual behavioral effectiveness criteria. However it did not provide the mechanism to compare the validity levels achieved with the levels found in other established instruments which were constructed with different approaches.

Project Epsom was designed to compare the criterion related validity of different tools.

As well as providing evidence supporting the saturation of the scales in the Wave Professional Styles questionnaires and the criterion related validity of behavioral competencies both from the Wave model and from independent competency models, Project Epsom provided evidence that Wave Professional Styles Competency Potential scales were more valid in combination in measuring overall effectiveness at work in a mixed occupational group. An important finding from across the different tools is that it is possible to create a mapping to competencies and use this to create an overall composite score from each of the established measures to effectively forecast overall effectiveness in a mixed occupational group.

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This raises an important consideration in understanding the validity of personality and styles measures in forecasting effectiveness in mixed occupational groups. As it is possible to construct an *a priori* overall personality composite by summing different competencies together (on each personality measure) which provides a valid forecast of an individual's overall effectiveness at work. This overall composite or superordinate work related personality or 'Big One' of work personality is a potentially important finding which we believe merits further investigation. It indicates that some individuals are lower across competencies and they will tend to be less effective overall in work. By contrast, some individuals are likely to be superlative performers overall who are stronger across the competencies forecast by the personality and styles questionnaires.

The highest average across competencies (Great Eight) was for Wave Professional Styles Competency Potentials. The Wave Professional Styles Competency Potentials validity against overall effectiveness was statically significantly higher than for non-performance driven and non-validation centric questionnaires (including OPQ, 16PF, NEO and HPI).

Validity is not simply something that a questionnaire possesses, but it is an ongoing process. A central part of that process is equipping users of Wave Professional Styles to make their application more effective, by helping them make valid inferences.

In an ideal world we could argue for confidence interval not to include r=.20 rather than non zero, although in practice very large samples may be required to do this (or the use of meta-analyses across validation studies). While this level of .20 is to an extent arbitrary, this minimum figure provides a benchmark to illustrate that the model shows criterion validity across its scales and that there are not scales within the model which lack validation evidence and hence do not support a meaningful inference being made by the interpreter to forecast an individual's effectiveness at work. Of course, the higher the validity beyond this level the better.