PPA Technical Manual:

Table of Contents

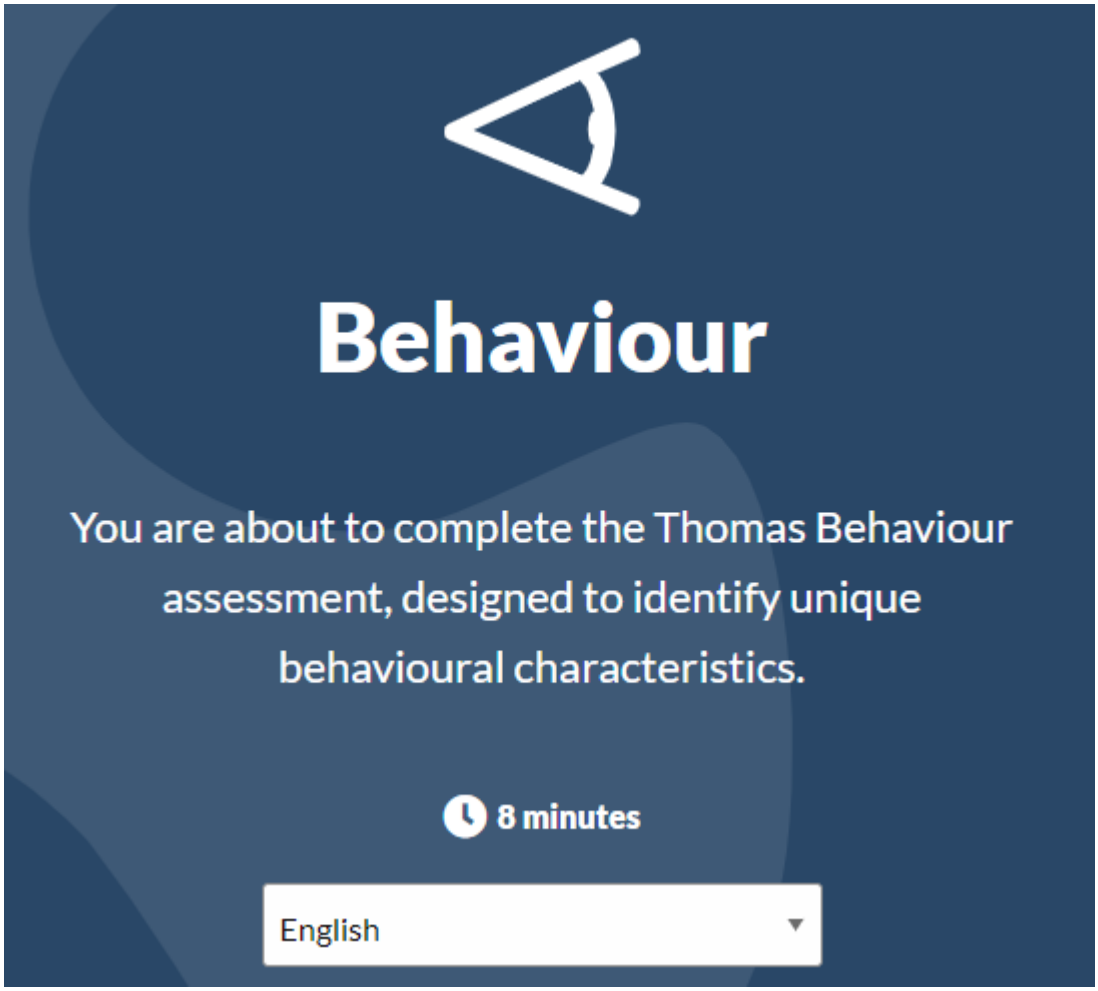
1.0 Assessment Use

The Personal Profile Analysis (PPA) is a 24-item, self-report, multi-scale instrument, designed for the assessment of work-related behavioural preferences. The PPA is an integral part of a system for use by line managers in job interviews. The four scales of the PPA are as follows: 1. Dominance; 2. Influence; 3 Steadiness; 4 Compliance. The instrument is linked to Marston's theory (Marston, 1928, 1931) that our behaviour is determined by whether we perceive our environment to be antagonistic or favourable, and whether we choose to adopt an active or passive response to it. PPA exists in multiple languages. Scores along the four dimensions of the PPA are represented visually in a series of graphs, in order to facilitate the direct comparison of candidates. Very high and very low scores on each scale are identified in a grey shaded zone, and a central horizontal line divides each chart into two equal areas. Participants are presented with 24 items, each comprising a set of four adjectives, and are required to indicate which of the adjectives they feel are most and least like them, within each set. The information elicited from the PPA is used in order to derive three profiles, each comprising the four dimensions: a profile reflecting the characteristics which the candidate feels are most like themself (M); a profile capturing the characteristics the candidate believes to be least like themself (L), and a composite profile, derived by subtracting the L scores from the M scores. Tests are administered online, either on computers, tablets or mobile phones. The Thomas system enables users to administer, automatically score and interpret responses to the PPA. Extensive report- and content- generating facilities are available, with a mixture of graphical and narrative information, and with pointers for feedback/interview discussion across a wide range of issues.

1.1 Taking the PPA

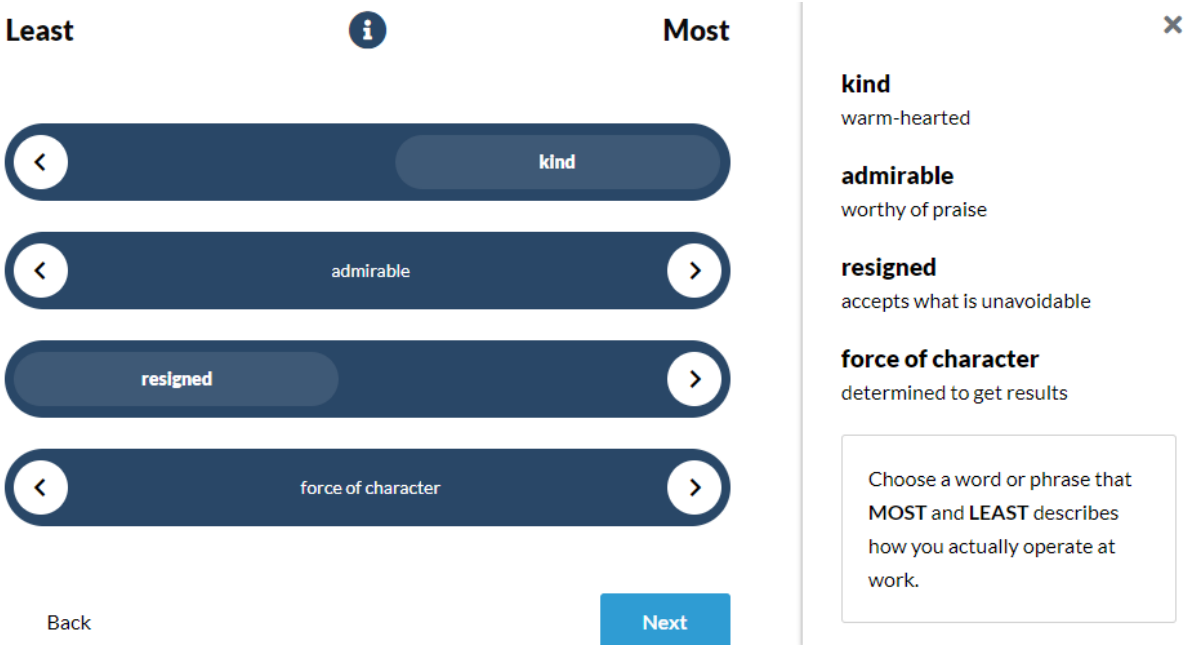
The PPA assessment identifies the behavioural characteristics of an individual. It provides information on your communication style, motivators, values and behavioural style. By taking the PPA you have taken the first step to increase your self-awareness, which is the foundation of all personal development. Self-awareness provides a platform in which you can reflect on your behaviours, your beliefs and how you may come across to others, thus giving you the ability to modify and adapt your behaviours when necessary.

Keep in mind that there are no 'right' or 'wrong' answers, and you cannot 'pass' or 'fail' the assessment. Your responses will highlight specific strengths and provide meaningful information to help you meet the demands of your environment.



The assessment should be completed in isolation and without interruption. You should aim to take no more than 8 minutes to complete it. Be certain that you complete the assessment thinking of yourself in your current working situation; if you are not currently in a role, then think of yourself in your last working environment. Or if necessary, think of yourself at home. Try and be as spontaneous and honest as possible when answering.

You will be presented with sets of four descriptive words. Choose one word or phrase that MOST describes you and one word or phrase that LEAST describes you. Your first response is usually the most accurate. You can also view descriptive words by selecting the information icon.



Once you have completed your assessment, you will be able to view your results. Your results are based on the way you answered the assessment, with your pattern of responses forming a holistic behavioural profile of you in the workplace. Select 'Read More' to expand your results.

1.2 Test Administration

The PPA provides information on an individual's communication style, motivators, values and behavioural style. Candidate's responses will highlight specific strengths and provide meaningful information to help them meet the demands of a multitude of environments. This information can be used to inform any decisions one makes regarding future development, whether that is one's career, education, or general personal and professional development. To administer the test, the following instructions are posted on a virtual page shown to candidates prior to taking the assessment. The instructions include the following:

- ✓ The assessment should be completed in isolation and without interruption.
- ✓ You should complete the assessment while you are well rested and in a good state of mind.
- ✓ You should not complete the assessment if tired, sick, at the end of a working day or directly after a night shift.
- ✓ Ensure you have sufficient time to complete the assessment in one sitting.
- ✓ You should aim to take no more than 8 minutes to complete it.
- ✓ Be certain that you complete the assessment thinking of yourself in your current working situation.
- ✓ If you are not currently in a role, then think of yourself in your last working environment or if necessary, think of yourself at home.
- ✓ Try and be as spontaneous and honest as possible when answering.
- ✓ There are no 'right' or 'wrong' answers.
- ✓ You cannot 'pass' or 'fail' the assessment.
- ✓ You will be presented with sets of 4 descriptive words.
- ✓ Choose one word or phrase that MOST describes you and one word or phrase that LEAST describes you.
- ✓ Your first response is usually the most accurate.

- ✓ You can also view descriptive words by selecting the information icon.
- ✓ Once you have completed your assessment, you will be able to view your results. Your results are based on the way you answered the assessment, with your pattern of responses forming a holistic behavioural profile of you in the workplace.

Ensure all potential candidates are aware of how the assessment should be completed. The candidates will be taking the assessment on Thomas International's Platform, through which an email link will be sent to candidates from an automated email address. Ensure that candidates know they require a stable internet connection and on what devices the assessments can be completed on, for example, a PC, tablet or mobile phone.

The following are a list of tasks given to assessment practitioners to ensure that they do the following:

- ✓ Avoid unethical use of assessment results, even after feedback has been issued to the clients.
- ✓ Be alert to possible negative unintended consequences of testing. Examples of these include:
  - ✓ Sending a candidate assessment results without directly giving feedback.
  - ✓ Turning down a candidate based purely on their results without consideration of all other factors of the interview process.
- ✓ Do not use assessment results that were obtained for one purpose for a different irrelevant or inappropriate purpose. For example, distinguish clearly between psychological testing and performance assessment. Do not use test results for performance appraisal or as a sole reason for retrenching employees.
- ✓ Actively promote a climate of trust within the organisation and between assessment practitioners and those being assessed.
- ✓ Treat candidates with courtesy and respect and impartiality regardless of any characteristics.

The PPA assessment is designed to be completed by candidates at home, on their own device, whenever they feel most comfortable to do so. It is however still possible to administer assessments in person, for example as part of an assessment centre. Assessment practitioners are also told to follow ethical practices in preparing for and administering assessment procedures:

- ✓ Ensure that the assessment location is accessible, safe, free of disturbances and fit for the purpose.
- ✓ Ensure that anyone who is involved in the administration is competent, and familiar with the assessment instruments and the relevant manuals.
- ✓ Make appropriate arrangements for assessing those with disabilities as and when necessary.
- ✓ Establish rapport with the candidates; minimising their anxiety is important.
- ✓ Remove potential sources of distraction, such as mobile phones.
- ✓ Ensure controlled access to assessment results and reports and that it is treated confidentially.
- ✓ Provide relevant parties with clear information concerning the purpose of the assessment and what to expect and, if appropriate, how those being assessed might prepare themselves.
- ✓ Clearly explain to candidates their rights and responsibilities before the assessment commences to ensure that candidates have both the information and the opportunity required to make an informed decision as to whether or not to be assessed. Informed consent is implied by a candidate's participation in a selection process.
- ✓ Ensure that computer- and Internet-based assessments, whether psychological or non-psychological, are performed in accordance with best practice guidelines and legal requirements.

1.3 The PPA Model

The PPA assessment is based in DISC theory, first proposed by Marston (1928). The PPA model describes our preferences towards or away from four behavioural factors: dominance, influence, steadiness and compliance. Understanding these preferences allows us to better understand people's communication style, motivators, values and behavioural approach.

Dominance indicates an individual's response to power. People high in dominance are driven to achieve in the face of opposition or antagonism. They are motivated by power and authority and strive to avoid failure. They are direct, competitive and innovative. People scoring low in dominance are more accommodating and hesitant.

Influence shows an individual's response to people. People high in influence are able to persuade others to react positively or favourably. They are motivated by public praise and recognition and strive to avoid rejection. They are persuasive, positive and friendly. People scoring low in influence are more reserved and serious.

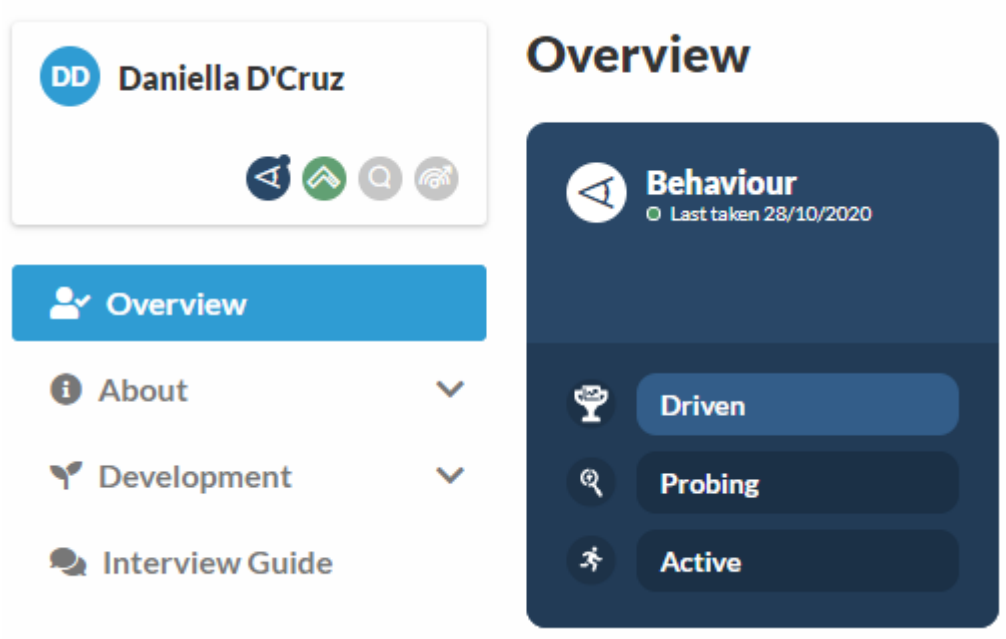
Steadiness demonstrates an individual's response to pace. People high in steadiness are motivated to complete task thoroughly to maintain the status quo. They are motivated by stability and strive to avoid insecurity. They are amiable, dependable and kind. People scoring low in steadiness are more restless and demonstrative.

Compliance reveals an individual's response to policy. People high in compliance produce a high work standard to avoid conflict or error. They are motivated by standard operating procedures and strive to avoid mistakes. They are careful, logical and perfectionistic. People scoring low in compliance are more independent and stubborn.

Section 2.1.2 below has more detail about the PPA model, its origins and research.

1.4 Interpretation and Reporting

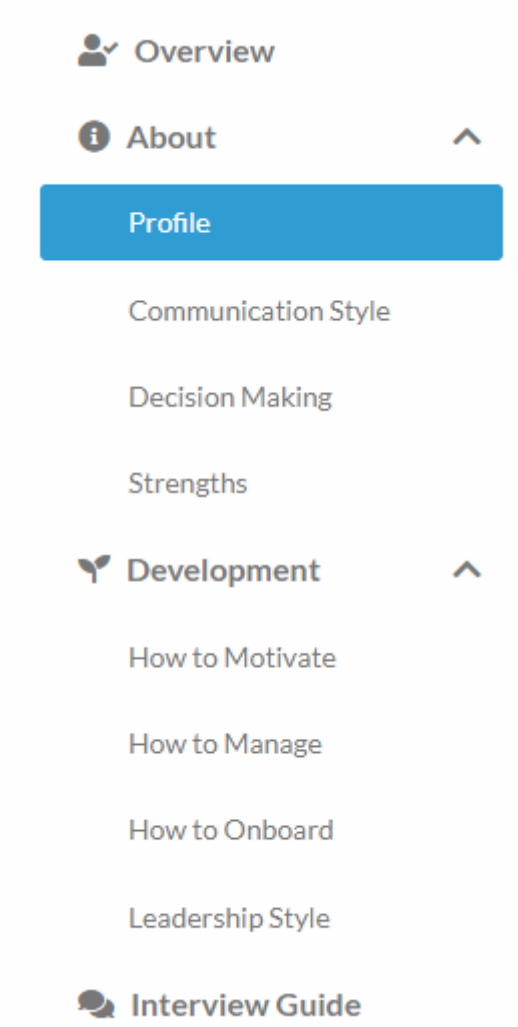
Results from the PPA assessment are scored automatically. Accessing a candidate's behavioural results from the Recruit tab will produce the below results.



Behavioural characteristics

From the results you will see the three behavioural characteristics displayed (in the example above these are Driven, Probing and Active). These three words describe the most prominent behaviours based on the answers the candidate gave in the assessment. Select from the drop down list which outcomes you would like to view.

Select any of the outcomes below for your chosen candidate, for example, by selecting About, you will have access to the candidate's Profile, Communication Style, Decision Making and Strengths regarding the specific job role. You can also view the Interview Guide.



Here you are able to access various PPA outcomes and content. By completing Thomas' Behaviour assessment it allows us to map a person's profile across four scales. The four scales are:

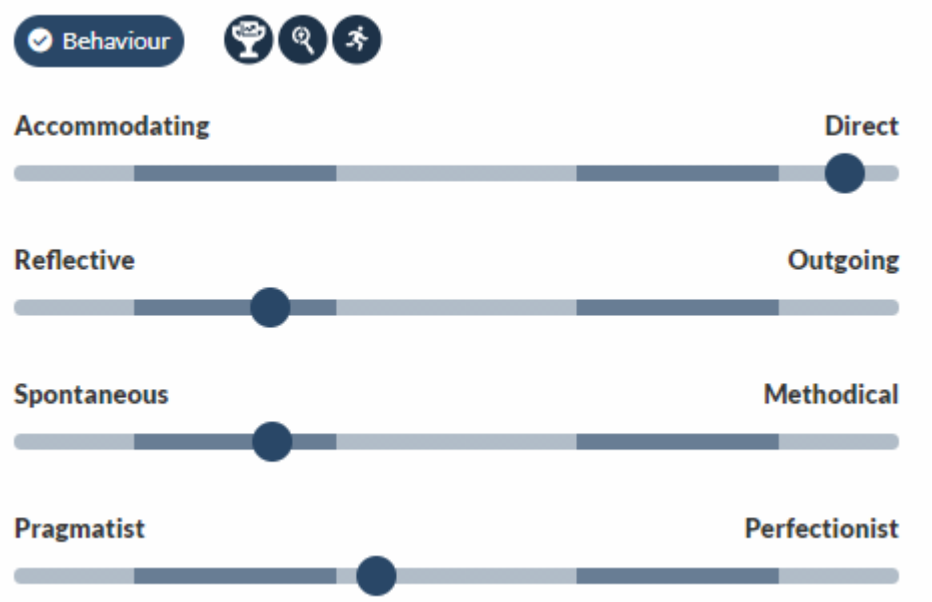
Dominance: Accommodating to Direct

Influence: Reflective to Outgoing

Steadiness: Spontaneous to Methodical

Compliance: Pragmatist to Perfectionist

Select Profile to see the candidate's profile in more detail relating to their behavioural preferences.



1.5 Feedback

The following are instructions given to assessment practitioners as what to do when administering feedback:

- ✓ Provide those assessed with feedback on the results of their assessment (wherever possible).
- ✓ Present results accurately and avoid negative labels and discouragement to the candidate.
- ✓ The implications of the results should be expressed in terms of opportunities vs restrictions.
- ✓ Implications should be conveyed with due consideration to the margin of error associated with any assessment method.
- ✓ Ensure that other relevant information is always considered when decisions are made on the basis of assessment results.
- ✓ Do not make final decisions on the basis of assessment results alone unless there is a clear defensible reason to.
- ✓ Take into account variations from standard procedures in assessment administration and special circumstances experienced by a candidate.

The following guidelines should be followed when giving best practice PPA feedback:

1. Although research shows that the PPA has high predictive validity when used correctly, nevertheless the information it contains does not come with a guarantee of total accuracy. For a variety of reasons, a particular profile may not reflect current reality. It is therefore vital that, in all cases, feedback should be indicative rather than definitive.

2. Ideally verbal feedback should be given before the individual has sight of any Thomas report.

3. The key phrases which should be used to preface all feedback statements include:

"The profile suggests …"

"Your profile indicates …"

"There are signs that …"

"This profile would normally describe someone who …"

"The indications are …"

4. During the feedback, behavioural traits should not be described as statements of fact. Instead, it is important to use phrases such as:

"There is a tendency …"

"This suggests that you may …"

"The likelihood is that …"

5. It is recommended that the PPA graphs should be used as a visual aid whilst giving feedback. When the individual sees their graph shape and the movement of profile factors, then their understanding is enhanced and they become more receptive to the feedback.

6. Whenever individuals are to be given a copy of the computerised PPA reports, there should be an opportunity for them to ask questions arising from it and to seek clarification where necessary.

7. The individual should be invited to agree that the description of their preferred style is accurate and to comment on any apparent inaccuracies so that these may be explored. Questions should then be used to explore these issues.

8. Behavioural style, as measured by the PPA, is only one of the key criteria required when making selection decisions. Intellectual ability, other relevant abilities, and previous experience are equally important. Because decisions should never be made based on profile only, candidates must not be led to believe that any selection decision was based only on their PPA.

9. Where PPA is used as part of a performance or development review process, then individuals must be given the complete picture including strengths and potential limitations.

10. When a candidate is selected, it is helpful to share PPA reports with the hiring manager to guide on how to best manage the individual. We suggest that reports be shared and discussed with new employees and used for coaching and supporting them.

11. When external candidates are not selected and request feedback, constructive feedback should always be offered.

12. Reinforce that the PPA is not a sole decision making tool but rather a managerial aid. It is a questioning tool to aid decision making and should always be used with other information about the individual.

1.6 Fairness and Bias

The PPA has been showed to have negligible bias on minority groups as an assessment itself (see study 3.2.1.3 for evidence). However, the implementation and use of assessments should also not have a negative effect on potential candidates because of their gender, ethnicity, age or education. Every applicant should have an equal chance to do their best in the selection process. Psychometric assessments have the potential to reduce adverse impact because of their objective nature. The following are steps provided to assessment practitioners to take in order to minimise the adverse impact on candidates and ensure a fair process before potential candidates are assessed:

- ✓ Ensure a comprehensive job analysis is done. A high level of adverse impact will occur if the criteria that you use to select candidates are not related to job performance.
- ✓ Align the job requirements to the psychometric assessments. A trained user on the psychometric assessments should assist HR professionals and the hiring managers to

align the job requirements to behavioural preferences, personality traits and aptitude and ability requirements.

- ✓ Prepare the potential candidates properly before administering the assessment (for a full list of instructions, please refer back to the *Test Administration* section).
- ✓ Ensure all employees who are involved in the recruitment process are trained in equal opportunities, diversity, employment laws and how to avoid unconscious bias.
- ✓ Obtain informed consent from potential candidates. Candidates should give consent that the assessment results will be released to the hiring panel with proper interpretation of the results. Candidates should also be aware that the reports will be kept confidential and will not be released to other users outside the hiring panel without their consent.

When going through the process of assessing potential candidates, assessment practitioners should ensure the assessment process is consistently applied. Candidates should all receive the same information and instruction beforehand. Ensure that all rules mentioned above are given to all candidates. Once the potential candidates are assessed, it is considered best practice to give proper feedback on the results of the psychometric assessment to successful and unsuccessful candidates. Please view the *Feedback* section for proper protocol on providing feedback.

1.7 Restrictions on Use

The employer has a duty to make reasonable adjustments if candidates have a disability, whether candidates are registered disabled or not.

Manual Capabilities. The PPA requires assessment takers to indicate their responses using mouse or trackpad clicks, touching a touch screen or typing a number corresponding to their answer. Assessment takers who are unable to respond in these ways could be asked if they would be comfortable responding via a proxy person who could input responses. Alternatively, technological solutions such as speech response software may be possible.

Handedness. There is no impact of handedness in completing the PPA.

Visual Impairments. The PPA is not a timed assessment, and so visually impaired candidates will not be disadvantaged if they take longer to complete. The assessment is built to modern technology standards. Please contact your Thomas consultant to see if the PPA is compatible with a particular screen reader or other accessibility software.

Hearing Impairments. Assuming that the test takers are able to read, it should be ensured that the test takers receive instructions and relevant information about the format of the test in advance so that they can check whether they can manage the test in its standard format.

Command of Testing Language. Although the intended use of the PPA is for workplace practices, the PPA has been administered and is safe to use for children as young as primary school age. Each PPA adjective has a button next to it that assessment takers can click to see a brief explanation of the word which can aid people with a lower reading age. The PPA is available in around 40 languages to allow assessment takers to complete in a language they are more familiar with.

Dyslexia. Dyslexia is more likely to adverse impact on aptitude and ability assessments than on personality/behavioural assessments. If a candidate indicates that they have dyslexia, they should be informed that it is unlikely to impact their scores, and that they can take as long as they wish on the assessment as it is untimed.

1.8 Software and Technical Support

The Thomas platform is designed to be used on computers, tablets and mobile phones. No additional software needs to be installed. The Thomas Support team will be able to assist you if you need any specific technical support.

For up-to-date information on Thomas International's privacy policy, GDPR policies, references and terms and conditions go to https://www.thomas.co/terms-and-conditions. For further technical information, contact your Thomas consultant.

2.0 Theory and Development

2.1 Development of the Original PPA

2.1.1 Introduction to the PPA

Recognition that the prediction of human performance is dependent upon an understanding of the interaction of many variables is commonplace and yet assessment procedures as utilized in education, government and industry rarely reflect this knowledge. There is still a tendency to restrict evaluation procedures to the more respectable and apparently more objective ability measures, even though it has been long admitted that ability, as a prediction of performances, will regularly account for less than half of the variance (Chauncey and Frederiksen 1951). The PPA, a forced-choice, adjective check list, is an effort to provide an instrument which will make available insights which are supplementary to information about experience training and ability. It assumes that an individual has a style of coping with his environment and that this style is closely related to the way in which he sees himself. There is no assumption that the profile presents a magical key for the understanding of another's behaviour, but it does appear warranted to claim that the PPA is able, in most cases, to integrate pieces of self-report data in a way which permits understanding according to a reputable model and, on the basis of this, provides information for both counselling and placement function. Although it must be emphasized that the PPA encompasses only some of the many facets resulting in human behaviour, it is equally important to be aware of the implications this restricted information can have.

The PPA is more an aid in the motivation of human behaviour than it is an answer to the selection-rejection problem. It is based on the theoretical position which underlines the interacting process and thus permits interpretations which are congruent with the actual concrete situation without any need to assume a static, mechanistic world wherein a given pattern of responses will have a constant significance. The PPA provides information which can be related to many nuances of interpersonal and person-thing relations without forcing the rest of the environment into an arbitrarily set mould.

2.1.2 Theoretical Rationale

The original impetus for PPA is found in the writings of Marston (1928; Marston, King & Marston, 1931) who postulated a theory of human behaviour as a function of the environment (which could be described along a continuum of antagonistic to favourable) and the individual's reaction (described along an activity-passivity continuum.) These two general dimensions provided a matrix from which an individual's typical pattern of interaction could be described along four characteristics as shown in Diagram 1 below.

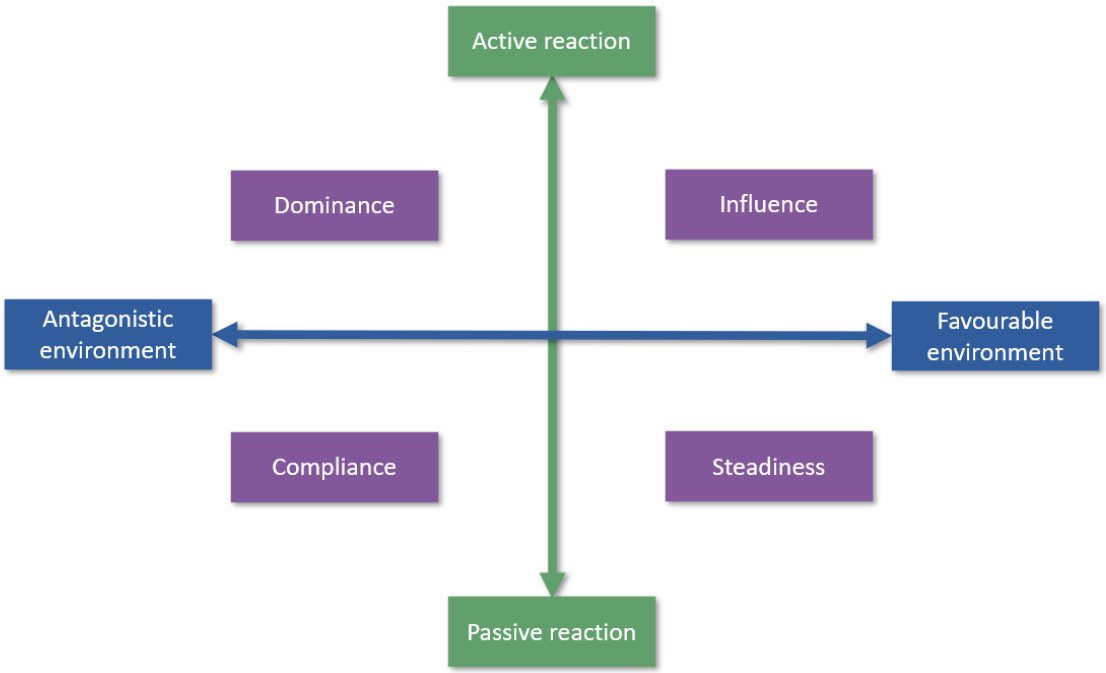


Diagram 1: Showing how the two theoretical dimensions of antagonistic/favourable environment and active/passive reaction relate to the four behavioural characteristics of dominance, influence, steadiness and compliance.

These four characteristics or factors can be described as follows:

1) Dominance – active, positive movement in an antagonistic environment

2) Influence (originally Inducement in Marston's work) – active, positive movement in a favourable environment

3) Steadiness (originally Submission in Marston's work) – passive agreeableness in a favourable environment

4) Compliance – cautious, tentative response to an antagonistic environment designed to reduce the degree of antagonism

It is assumed that most people show all four of these dimensions at times; however, it is also assumed that an individual develops a style of life which places particular emphasis on certain aspects and less on others. This is a gradual learning process dependent in large measure upon the reactions of others to an individual's efforts to establish his own characteristic mode (Sullivan, 1953; Rogers, 1951.) Out of these efforts comes a self-image which the person will strive to maintain and to enunciate in overt behaviour (Lecky, 1945) while he also seeks out roles and occupations which are in keeping with this self-image (Sarbin, 1954; Super, 1957.) This results in a moderate degree of self-consistency for most people and provides a basis for the prediction of an individual's reactions.

The difficulty is that of establishing a technique for describing this self-image with some degree of accuracy and within a framework which provides for some comparability. The problems in this area both of a methodological and of a substantive nature have been well documented by Wylie (1961). Yet the usual approach of attempting to distil this factor from the impressions of an interview are particularly hazardous. Research into the personnel interview has regularly demonstrated its lack of validity (Ulrich and Trumbo, 1965.) In fact, the whole area of research in person perception has underlined the extreme difficulties involved in establishing procedures which will bring about reliability and validity without training, structuring, and clear definitions

(Allport, 1961, pp. 517 – 20; Bronfenbrenner, Harding, and Gallwey, 1958, Bruner, Shapiro, and Tagiuri, 1958; Cronbach, 1955.)

This problem has led to the development of assessment techniques which are intended to provide a picture along limited dimensions, of an individual's self-image. The PPA evolving from Marston's model is one of these and is part of a rather large body of evidence which supports the utility of self-report data organised around a two-axis model. The two-axis structure is consistent with Flanagan's (1935) factor analysis of the Bernreuter Inventory (Bernreuter, 1933.) He found two relatively independent scales which he called "self-confidence" and "sociability" corresponding roughly with the dominance-compliance and continuum and the inducement-submission continuum. Leary (1957) has developed a rather complex system of interpersonal diagnosis around the axis of love-hostility (approximating Marston's dominance-submission.) Borgatta, Cottrell and Mann (1958) found two major factors characteristic of individual interaction: Individual assertiveness and sociability. This finding is consistent with Carter's (1954) factor analysis of interactions in small groups where he found two individual factors (1. individual prominence and achievement; 2. sociability) and a group-oriented factor (aiding attainment by the group.) These positions are in line with current emphasis on the conflict between achievement motivation and affiliation motivation.

All in all, there appears to be considerable research basis for measuring behaviour along the two axes (four dimensions) described by Marston (1928). Basically, the PPA attempts to measure whether an individual sees themself as characteristically seeking out and/or reacting to situations that are challenging or friendly and whether the response pattern is one of activity or passivity.

2.1.3 Development of the Original PPA

The PPA is a self-administering forced-choice adjective checklist consisting of twenty-four tetrads of descriptive words. Directions and a sample tetrad are as follows:

"The following descriptive words are grouped in sets of four. Examine the words in each set. Put an 'X' under column M next to the word that is most like you in each set. Put an 'X' under column L next to the word that is least like you in each set. Be sure to check only one word under M for each set, and only one word under L for each set."

	M	L
Persuasive		X
Gentle	X	
Humble		
Original		

The original experimental form of the instrument had the same format of twenty-four tetrads. The descriptive words used by Marston (1928), and Marston, Kind and Marston (1931) were incorporated into PPA insofar as possible. The sources for the remaining words were dictionaries, thesauruses and similar volumes; the criterion for inclusion of a term was its face validity within the Marston model. Each tetrad contained one term assumed to relate to each of the four dimensions. This experimental form was administered to 115 participants in 1958 (67 males, 48 females) with an occupational distribution as follows: 46 college students, 17 teachers, 17 supervisors, 16 other professionals, 13 office workers, 6 miscellaneous.

On the basis of this administration a frequency distribution of responses was made. The words were then re-combined in tetrads such that each tetrad contained a word related to each dimension, but now an effort was made to combine words of relatively equal response strength. Consequently, high response words were grouped with other high response words, low response words with other low response words. Seventy-six of the original ninety-six words were absorbed

in this manner. Five additional tetrads were then constructed to bring the total once more to twenty-four. Of the words retained, 39% are the same or of the same word root as in Marston.

For each of the four dimensions three scores are calculated. Firstly, two subscale scores are calculated: 'M' which is the number of words corresponding to that dimension that were selected as most like the assessment taker and 'L' which is the number of words corresponding to that dimension that were selected as least like the assessment taker. The total or overall score 'T' is then calculated by subtracting the L score from the M score.

The revised form was administered to 500 participants (388 males, 112 females) in 1958. The breakdown by occupation for this group was: 212 managers and supervisors, 128 professionals, 62 clerical, 38 salesmen, 34 machine operators, and 36 miscellaneous. A random sample of 100 participants was drawn from this group to determine split-half reliability and intercorrelation among the four dimensions. Table 1 gives the split-half product moment reliability coefficients, corrected by the Spearman-Brown formula.

	r
Dominance	.93
Inducement	.78
Submission	.84
Compliance	.72

Table 1: Reliability Coefficients of the Revised Form

These figures indicate that the PPA had satisfactory internal consistency when assessed by the split-half method. Table 2 indicates the intercorrelations of the four dimensions. It can be seen from Table 2 that the dimensions are relatively independent considering the forced-choice approach.

	D	I	S	C
D		.23	-.35	-.18
I	.23	--	.32	-.04
S	-.35	.32	--	.23
C	-.18	-.04	.23	

Table 2: Intercorrelations of the Dimensions

The scoring of PPA results in three profiles, each with four dimensional scores. These profiles are derived from M, L, and T (total) scores. It is assumed that the T pattern will reflect most accurately the overt behavioural characteristics of an individual. The M pattern is the clearest measure of how a subject wants to portray himself and is, as a result, most easily distorted. The L pattern, since it is more indirect and less open to intentional distortion, serves as a check on the M pattern. In this sense, the L pattern can be seen as reflecting, more than either of the other patterns, the basic personality characteristics. However, this is not to say that the L pattern measures unconscious aspects of personality or that it cannot be distorted. It serves primarily when compared with the M pattern as an indicator of the probable consistency of the individual's usual behaviour.

2.2 Initial Research

2.2.1 Initial Reliability Studies

Two initial studies of the reliability of PPA were undertaken. The first of these was a test of the internal consistency of the four dimensions by use of the split-half reliability method. The sample used was 100 participants (75 males and 25 females) drawn randomly from a population of 1200 participants.

The occupational distribution of the sample was: 46 managers and supervisors, 17 clerical, 10 engineers, 10 salesmen, 5 technicians, and 12 miscellaneous. Table 3 shows the results of this analysis.

	r
D	.86
I	.89
S	.80
C	.81

Table 3: Split-Half Reliability Coefficients

In 1959 a test-retest reliability analysis was undertaken on 72 participants (47 males, 25 females) all of whom were employed in executive or professional positions. Retest intervals ranged from one to twelve months with a mean of three months. Table 4 gives the product moment correlation for the test-retest analysis.

	r
D	.84
I	.70
S	.77
C	.87

Table 4: Test-Retest Reliability Coefficients

These results suggest that PPA is a relatively reliable measure, having both adequate internal consistency and stability over-time.

2.2.2 Initial Validity Studies

The validation of an instrument such as the PPA involves a number of methodological problems. Its principal function is to describe an individual's typical pattern of behaviour. It would thus be classed as a wide bandwidth instrument in Cronbach's (1960) phrase. The choice to develop such an instrument automatically brings with it a series of difficulties. Behaviour can be exhibited in a

number of ways and the appropriateness of the behaviour will depend upon many other variables. No single kind or piece of behaviour is universally desirable.

This leads to the other aspect of the validity problem: the criterion. The complexity of this issue has been clearly illustrated by Kelly and Fiske (1951), but it has not been resolved. In the traditional model performance ratings or production have been used as criteria in spite of the fact that it is implicitly recognised that the means to such heterogeneous goals will be many.

In spite of these difficulties a number of initial validity studies were made in cooperation with other organisations. All of these studies had within them the inadequate controls often associated with applied research; restricted sample; lack of control of variables such as geographical placement; supervisor; loss of sample due to attrition. Yet there did appear to emerge a solid degree of evidence for the utility of the instrument which, when these problems are considered, must be carefully examined.

With this brief overview the results will be presented. The studies are grouped into four classifications: criterion prediction studies, differential selection studies, occupational differentiation studies and construct validity studies.

2.2.2.1 Criterion Prediction Studies

These studies are summarized in Table 5. It is clear that it is nigh impossible to predict success in a complex operation on the basis of individual scores. Nonetheless the results are reported here because they show the inadequacy of the traditional correlation model to demands of diffuse criteria. It is important to note that in all of these studies several other variables; such as biographical data, ability and experience factors, personality and value tests; were also correlated with the criterion with consistent evidence that they were less related to the rating than were PPA scores. Another aspect of Table 5 data which deserves attention is the different pattern of relationships which are significant in different studies. These are consistent with the models or stereotypes which would be associated with the occupational position.

Study	Nature of Group	N	Significant Correlations
A	Life Insurance Agents	154	Dominance r=.19, p<.05; Submission r=-.19, p<.05
B	Claims Managers	37	Inducement, r=-.34, p<.05; Compliance, r=.38, p<.05
C	Engineers	70	Inducement, r=.24, p<.05; Compliance, r=-.27, p<.05

Table 5: Criterion Prediction Studies Correlating the PPA Factors to Subsequent Supervisor Ratings in Various Roles from Various Organisations

2.2.2.2 Differential Selection Studies

These studies are essentially concurrent validity studies wherein current performance is related to a predetermined model or pattern of test scores which should be indicative of success, other things (such as ability, experience, etc.) being equal. Table 6 presents the results of two studies. Both of these involved a Chi-square analysis which resulted in dichotomizing performance into High and Low. Thus, although these results suggest a definite relationship between successful performance and PPA pattern, they also imply the expectation that this relationship will drop as the standards for performance are modified. Nonetheless, this is evidence that behavioural results are congruent with test description of characteristic behaviour.

Study	Nature of Group	N	Chi-Square	Tetrachoric Correlation
D	Insurance Agents 80	20.23	.73 (p<.01)	
E	Insurance Agents 53	5.27	.49 (p<.05)	

Table 6: Differential Selection Studies

2.2.2.3 Occupational Differentiation Studies

A question related to the studies summarised in Table 6 above is that of distinguishing occupational groups by typical patterns. Much of the literature in career development and career satisfaction (e.g. Roe 1956; Super, 1957) has suggested the relationship between personality–behavioural variables and occupational choice. Analysis of PPA patterns show corroboration of this position. Mahan and Wicas (1964) described a pattern for school guidance counsellors which showed a high degree of uniformity among subjects. In like fashion, data on PPA patterns of engineers show marked consistency and distinct variation from the patterns of sales manager in the same institution. Table 7 shows correlations with the ideal profile for sales.

	Sales Managers	Engineers	Total
Positive, significant correlation	27	5	32
Insignificant/negative correlation	5	27	32
Chi-Square = 30.25 (p<.001)			

Table 7: Chi-Square Analysis of Sales Managers and Engineers Correlations with Ideal Sales Profile

2.2.2.4 Construct Validity Studies

Perhaps the most fundamental question to be asked is what evidence exists to support the assumption that the scores on PPA are, in fact, related to the behaviour they purport to describe and predict. It is here that the most important validation findings have taken place. Table 8 attempts to summarise these. The construct validity information is directly related to the theoretical rationale of the instrument and to the principles of interpretation.

PPA Factor	Guilford-Zimmerman Factor	Correlation
Dominance	General Activity	Positive (p<.01)
Dominance	Masculinity	Positive (p<.05)
Dominance	Restraint	Negative (p<.01)
Inducement	Social Ascendance	Positive (p<.05)
Inducement	Sociability	Positive (p<.01)
Inducement	Masculinity	Positive (p<.01)
Inducement	Restraint	Negative (p<.05)
Inducement	Reflectiveness	Negative (p<.05)
Submission	Restraint	Positive (p<.05)

Submission	Emotional Stability	Positive (p<.05)
Submission	Objectivity	Positive (p<.05)
Submission	Cooperativeness	Positive (p<.01)
Submission	General Activity	Negative (p<.01)
Submission	Reflectiveness	Negative (p<.05)
Compliance	Restraint	Positive (p<.05)
Compliance	Reflectiveness	Positive (p<.01)
Compliance	Sociability	Negative (p<.05)
Compliance	Emotional Stability	Negative (p<.05)
Compliance	Masculinity	Negative (p<.05)

Table 8: Construct Validity Study Correlating PPA Factors with Guilford-Zimmerman Factors

There appears to be in these data considerable evidence that the behaviours which are associated theoretically with each dimension are seen by the assessment taker in their self-report on the Guilford-Zimmerman. It is important to note the support for the distinction between Dominance and Inducement where both show positive, assertive behaviour with Inducement connoting the social dimension of such activity; so too the distinction between the cooperative, stable, but basically passive behaviour associated with Submission and the cautious, hypercritical, less stable passive behaviour associated with Compliance is suggested by the material in Table 8. The significance of this support for the construct validity of the PPA of critical importance since the major function of the instrument is to provide some tentative insights into probable behavioural reactions under given conditions; i.e. it attempts to define some of the parameters which can be assigned to a given individual as they are assessed as a part of the complex psycho-social interaction situation.

2.3 Summary of the Development of the PPA

It appears that there is considerable support for the use of the PPA. The four dimensions of the instrument have correlates with other accepted measures and with behavioural ratings which are directly supportive of their conceptual validity. In addition, there is good reason to believe that the dimensions measured are highly relevant to the behaviours which are of concern in occupational settings. However, it must be emphasized that the PPA encounters the same insuperable hazards which have applied to all prediction studies where the criterion is assumed to be an absolute and measures are correlated with this absolute. Human behaviour is much too complex for this simplistic model and the inevitable result is modest validity coefficients unless the behaviour to be predicted can be carefully circumscribed. Thus, it must be clearly stated that a mechanical use of the PPA as a basis for selection or placement will not guarantee improved performance. At the same time, it is equally important to make clear that the PPA information can be effectively utilised when it is coordinated with information about the situation, others in the situation, and the variability of the situation.

2.3.1 Comments on the Forced-Choice Nature of the PPA

As a self-report instrument, the PPA is open to conscious distortion. Precautions were taken to control for social desirability by placing similarly desirable words in the same tetrad (as measured by frequency of choice of word in the original administration). Following the position of Edwards (1957) and the findings of Newman, Howell, and Harris (1957) the "forced-choice" technique has been employed in the PPA to further control for social desirability and thus limit the contamination this might introduce into the measures of the four dimensions. In addition, the use of an adjective checklist avoids the problem of response set (Couch and Keniston, 1960) or response style (Jackson and Messick, 1958) which arises in the use of inventories with differential response alternatives (such as yes/no, true/false, etc.). The survey of the literature on forced-choice vs. free choice techniques by Zavala (1965) confirms some of the hopes of this intent while it also raise questions as to the most desirable format for a choice (see also, Berkshire and Highland, 1953).

2.3.2 Norms Applicability

The PPA does not have applicable Norms because of the self-referential and ipsative nature of the items. A person's scores are presented relative to other factors (i.e., preference to behave in particular ways over others), rather than relative to a reference population. A norms section is therefore non-applicable.

2.3.3 Suggested Uses of the PPA

The PPA plays two important roles. Firstly, it brings to the foreground the theoretical concept of individual differences and raises the question for those concerned as to how the individuality of this person can best be related to the goals of the given organisation. Secondly it provides another piece of information which is directly relevant to the decision-making process where human interactions are concerned. Put in another fashion, the PPA provides insights which should permit more intelligent career planning by the individual themself and more effective organisational use by superiors and supervisors. Such information will be of maximum use when it is part of an entire inventory of the total situation such that each individual's behavioural pattern can be seen in relation to all others. Yet the emphasis remains on the wise use of the information by human beings; the instrument merely provides information about an individual's self-image in a manner which makes it comparable to that of others. The final decisions must be made by people within a context of other information and the weight which should be attached to each source can only be determined through wise, careful and judicious evaluation.

From both the theoretical rationale and the studies reported above it seems clear that the PPA will be most effectively used when supported by empirical assessment based on evaluation of successful personnel in a situation. In this way individual and situation are seen as an interacting complex, each influencing the other. It cannot be expected to replace measure of ability and training, but to aid in the selection, among individuals who meet these other standards, of those most likely to function effectively in the given situation.

In like fashion, the evaluation of the PPA as a tool in the assessment of people demands of the evaluator an adequate background in human behaviour and test construction. It is hoped that the data presented in these pages when combined with actual experience and analytic observation will form a basis for such evaluative judgments.

2.4 The DISC Model in Contemporary Psychology

It has been around 100 years since Marston's original works describing the DISC model, and around 50 years since Hendrickson first created the PPA assessment. In that time there have been many developments in relation to personality psychology and so it is necessary to consider the PPA in relation to more contemporary psychological theory in order to support its use today.

The original theoretical foundation of the PPA considered theoretically-similar, two-axis models such as those proposed by Flanagan (1935), Leary (1957), Borgatta, Cottrell and Mann (1958) and Carter (1954) which are detailed in section 2.1.2.

There are also clear parallels with models which still attract research attention today such as socioanalytic theory (Hogan, 1982) which posits that individuals are inherently motivated firstly to get along socially by gaining acceptance and secondly to get ahead by achieving group status and power (e.g., Hogan & Blickle, 2017). There are also clear parallels with the interpersonal circumplex originally proposed in the 1950s that describes interpersonal behaviour firstly in terms of power and secondly in terms of affiliation (see Freedman, Leary, Ossorio & Coffey, 1951). It is considered a measure of the interpersonal aspects of personality only (see Gurtman, 2009).

The five factor model of personality is both widely accepted by academics and has been widely supported by research (e.g., Saucier & Goldberg, 1998). It aims to be a comprehensive overarching model of personality, whereas the two-axis models above aim to describe only aspects of personality related to interpersonal behaviour. For example, in comparing the five factor model with the interpersonal circumplex, McCrae and Costa (1989) concluded that the circumplex could be defined in terms of two of the five factors (agreeableness and extroversion). The author's argued the models complemented each other and may each have their own use in describing behaviour. Relating this specifically to the PPA, the two dimensions of favourable/unfavourable perceptions and active/passive responses detailed in section 2.1.2 don't aim to comprehensively define personality, but rather aim to create a model of interpersonal behaviour that is simplified to the point of being useful to non-psychologists in an occupational context.

The PPA and other DISC tools have been employed in areas such as informing employee selection (Diekmann & König, 2015; Furlow, 2000), predicting employee success (Kasselmann et al., 2002), reducing staff turnover (Childs et al., 2017), tailoring communication styles to individuals (Scarbecz, 2007; Slowikowski, 2005) and improving teamwork (Mellor, Hyer & Howe, 2002; Lykourentzou, Antoniou & Naudet, 2015).

2.5 Development of the Current PPA Form

The current version of the PPA was released in 2019 and followed research to update and enhance test items. Firstly, banks of adjectives were created related to each of the four PPA factors. These were then used to build items with one adjective corresponding to each factor. Finally, research was conducted to build a new, 24-item PPA form. These stages are detailed below.

2.5.1 Creation of new item bank

2.5.1.1 Creating adjective lists

Adjectives lists were created for each of the four PPA factors using adjectives from the current PPA, from synonyms of those words taken from thesauruses, from the PPA report content of corresponding profiles, from adjectives used in PPA training, and from discussion with long-time PPA trainers and users. In total 378 adjectives were selected as candidate adjectives.

2.5.1.2 Translatability Check

Adjectives were translated into Brazilian Portuguese, Danish and Dutch. The resulting words were then back-translated into English by independent translators. An English person checked for consistency between the back-translations and the original adjectives. If two out of the three languages had inconsistencies then the adjective was considered to be specific to English. For example, 'level-headed' did not pass the translatability check, as it seems to be a description specific to English. In total 16 adjectives were not translatable.

2.5.1.3 Normative Pilot

It is difficult to analyse the statistical effectiveness of single adjectives when they are presented ipsatively as quads; an adjective may be ineffective because of the word itself, or because of the other three words that it is presented with in the quad. For this reason, adjectives were normatively piloted using a Likert scale where respondents chose on a scale between 'very inaccurate' and 'very accurate'. In order to keep the work-based element of the PPA, the question asked was, "Think of yourself in your work situation. Examine each adjective in turn, and rate how accurate it is as a description of you at work.".

362 adjectives were piloted on 381 participants. After checking item-scale correlations, and in a focus group with PPA experts, 45 adjectives were selected to go forwards from the D scale, 38 from the I scale, 48 from the S scale, and 33 from the C scale.

2.5.1.4 Valence Pilot

In order to choose which adjectives should make up a quad it is necessary to match them for positivity. The 164 adjectives from the normative pilot were presented to participants in pairs as part of a comparative judgement task, "Imagine you are selecting a new employee for a similar role to yours. Which of the following would you prefer them to describe themselves as?".

117 participants completed up to 150 comparisons each. 74% were female, 26% were male and one participant did not enter their gender. The mean age was 35.5 (SD=12.1). The most common job function was "Human Resources and Employment" (41 respondents), followed by "Other Job Function" (13 respondents), followed by "Research" (8 respondents).

The system used a chess ranking algorithm to adaptively select pairs of items that were ranked similarly positively. Each adjective starts with a score of 1400 points, and each comparative judgement adjective pairing is considered as a competition with a winner and a loser. If an adjective is chosen as preferable then it 'wins' the contest and otherwise it 'loses' the contest.

To calculate the number of points gained or lost for each adjective on each contest, the estimated probability of one of the adjectives winning is calculated like so:

Expected probability = 1 / (1 + 10 ^ ((adj1_score – adj2_score) / 400)

Based on this, the score of the winner is increased by:

32 * 1 – expected probability

And the score of the loser is (decreased) by:

32 * 0 – expected probability

If the scores of the two adjectives are close together, then they will each have a .5 probability of winning, but if they are apart from one another then one will have a higher probability than the other. If an adjective with a high probability of winning does so, then it will gain few points, but if the same adjective loses then it will lose many points. The maximum possible number of points to gain or lose for each competition is 32.

On average each adjective was ranked 175 times. The ranking algorithm produced a table from most to least positive; the most positive word was “communicative”, followed by “proactive,” and the least positive word was “withdrawn”, followed by “aggressive.”

2.5.1.5 Word Frequency and Understandability Analysis

The adjectives that reached this development stage were shown in the normative pilot to be statistically effective in distinguishing between high and low scores on their respective scales. This means that the majority of the pilot respondents were able to respond in a way that was consistent with the other adjectives measuring the same trait. Nevertheless, there will always be a fraction of the population with a lower reading age, and ideally the words will be understandable by all sections of the population.

Word frequency was established using Google NGram Viewer, indicating how often each word is used in British English in written books published between 1999 and 2008. The words ranged in frequency from 185 times per million for the adjective ‘patient,’ down to 0.003 times per million for the adjective ‘self-starter.’ Nevertheless, word frequency provides only a guide. For example, it is unclear from word frequency analysis whether ‘patient’ refers to someone willing to wait, or someone in hospital. Similarly, the word ‘networker’ is rarely used in books (.07 times per million words), but the word ‘networking’ is commonly used, and it is likely that questionnaire respondents can therefore infer the meaning of ‘networker’.

An additional pilot was conducted with 20 young adults aged 15-17 in UK schools. 33 words were selected, and young adults were asked to define the meanings of the words. The objective of the pilot was not to check if the respondents could give a formal definition, but just to demonstrate their understanding or misunderstanding of the words. The percentage of correct definitions ranged from 23% for ‘tenacious’ to 100% for ‘laid-back.’ Importantly, it was noted where participants had systematic misunderstandings of words. For example, participants misunderstood ‘tactful’ as ‘tactical’ (someone who is good at planning and strategy). This would move the adjective from the S scale to the C scale.

A cut-off was not used to deselect adjectives for reasons of understandability, since there is no research to set the level of the cut-off; however, results were later taken into account when choosing the final set of 24 quads.

2.5.1.6 Quad Creation

Quads were constructed by matching adjectives from each of the four scales for positivity. 55 new quads were chosen. The most positive quad was “Driven vs. Engaging vs. Supportive vs. Adaptable”, and the least positive quad was “Aggressive vs. Life-of-the-party vs. Soft-touch vs. Shy.”. The full bank of 79 items comprised of these 55 quads and the 24 quads from the original PPA.

2.5.2 Creation of the new PPA form

The 79 items were piloted on 1215 participants from a range of different organisations in a range of industries. Organisations were incentivised to take part in the project by complementary analyses of their PPA data trends.

A script was written to randomly select 24 items from the 79, apply PPA scoring, then conduct and report on analyses. These were scale Cronbach’s alphas, correlations between new

assessment scores and old PPA scores and inter-scale correlations. This script was looped through 10,100 times creating an equal number of potential PPA updates.

As an investigation into optimised solutions, all current solutions were ranked on their median alpha and then the average rank was calculated for each of the 79 items, based on the solutions that they appeared in. This acted as a proxy for the performance of each item and allowed items to be ranked. The best 25 items were put back into the optimisation script (the best 24 items didn't have any possible solutions as adjectives were repeated). This was run 100 times. Solutions had very similar psychometric properties, but one solution was chosen due to the best alphas and similarity to the current PPA.

At this stage, accessibility of language was analysed based on the Word Frequency and Understandability Analysis above. None of the words identified as particularly low frequency or lower in understandability occurred in the final 24 items.

2.5.2.1 Construct Validation of the new PPA Form

Following the creation of this new PPA form, a study was carried out in 2021 among 351 participants in order to test that the new 24 items was actually measuring what it intends to. Participants completed the new PPA form as well as a number of measures that are conceptually related to the PPA factors. The first assessment included is the Mini International Personality Item Pool (Mini-IPIP), which is a short-form assessment that measures the personality traits within the 'Big Five' Five Factor Model (Donnellan et al., 2006). Specifically for this study, we looked at the personality traits of Extroversion and Agreeableness. The rationale for this was based on a study by McCrae and Costa (1989) which concluded the Interpersonal Circumplex (originally Freedman, Leary, Ossorio & Coffey, 1951), which is conceptually similar to the PPA and has been found to be highly correlated (see Study 3.2.1.6 in this manual), could be defined in terms of these two traits. The PPA factors of DISC fall along two dimensions: perceiving an environment as antagonistic or favourable and the individual's active or passive reaction to it. Active behaviour traits encompass preferences towards Dominance and Influence and away from Steadiness and Compliance while Favourable behaviour traits encompass a preference towards Influence and Steadiness and away from Dominance and Compliance. Extroversion should relate to active traits while Agreeableness traits should relate to favourable traits because of the theoretical similarities between the two. After running correlations between the two it was found that agreeableness and those who perceive environments as favourable correlated by r=0.32 and extroversion and those who have active reactions correlated by r=0.60. Because extroversion and agreeableness measure personality and DISC traits measure behaviour, it is expected that these correlations will not showcase complete equivalence as personality and behaviour are conceptually distinct. It's likely the constructs of extroversion and active reactions are more closely related because they are both one's approach or reaction to an environment. Agreeableness is one's approach to an environment whereas favourable is how the person views the environment which could explain the weaker correlation.

For a further breakdown of the correlations individually between both extroversion and agreeableness, please see below:

- ✓ Dominance and Extroversion r = 0.19
- ✓ Dominance and Agreeableness r = -0.22
- ✓ Influence and Extroversion r = 0.62
- ✓ Influence and Agreeableness r = 0.16
- ✓ Steadiness and Extroversion r = -0.35
- ✓ Steadiness and Agreeableness r = 0.26
- ✓ Compliance and Extroversion r = -0.56
- ✓ Compliance and Agreeableness r = -0.13

All of these correlations demonstrate either a strong positive or negative relationship between the DISC factor and extroversion and agreeableness depending on the personality and behaviour trait combination. Each correlation direction produced was in line with the theoretical nature of each DISC factor. The directions and strengths of these correlations provide strong evidence for the PPA measuring what it is intended to.

The next correlations found were between PPA's DISC factors and self-report scales asking participants to rate how much each set of characteristics sounded like them. Participants were shown characteristics that comprise of each DISC factor, such as 'assertive, competitive, direct, driving, forceful, inquisitive, self-starter' for Dominance and so on. The correlations are as follows:

- ✓ Dominance and those who chose Dominance as most like them r = 0.65
- ✓ Influence and those who chose Influence as most like them r = 0.53
- ✓ Steadiness and those who chose Steadiness as most like them r = 0.40
- ✓ Compliance and those who chose Compliance as most like them r = 0.51

These results show very strong correlations between all four DISC factors and those who reported the set of characteristics that sounded most like them. This adds to the construct validity evidence that each DISC factor is measuring what it intends to measure.

The final correlations found were between International Personality Item Pool (IPIP) scales that were conceptually similar to the PPA factors Dominance, Influence, Steadiness, and Compliance. We used the IPIP scale of Assertiveness to compare to Dominance, the IPIP scale of Extroversion to compare to Influence, the IPIP scale of Non-Planfulness (reverse coded to Planfulness) to compare to Steadiness, and the IPIP scale of Organisation to compare to Compliance. The correlations found are as follows:

- ✓ Dominance and Assertiveness r = 0.51
- ✓ Influence and Extroversion r = 0.60
- ✓ Steadiness and Planfulness r = 0.14
- ✓ Compliance and Organisation r = 0.30

These correlations show strong relationships between each of the DISC factors and corresponding IPIP scales that are conceptually similar to each respective factor. Steadiness and Planfulness did not correlate as highly as expected, but upon reviewing the items, it is clear that the Planfulness IPIP measure is more closely related to Compliance than Steadiness (r = 0.37). Because the PPA is a forced-choice assessment, correlating with one factor would have an influence on correlations with another factor, thereby reducing the correlation between Steadiness and Planfulness. However, given the otherwise convincing support for the Steadiness scale when compared to Agreeableness (as a component of the Favourable behaviour trait) and to those who chose Steadiness as the factor most like them, there is enough confidence that the Steadiness scale is measuring the construct it intends to measure.

Taking together, these pieces of evidence give confidence that the new PPA form is indeed measuring Dominance, Influence, Steadiness and Compliance.

2.5.3 Properties of the new PPA form

The following analyses are based on the same 1215 sample used to create the new PPA form.

2.5.3.1 Reliability of the new PPA form

Cronbach's alphas were calculated based on each of the subscales (most and least for each factor) and overall factor scales. These can be seen in Table 9. Based on EFPA guidelines, median scale reliability should be above .70 for a reliable measure (Evers et al., 2013). Median alpha for PPA overall scales is .83 and for subscales is .77, supporting the reliability of the new PPA form.

Scale	Reliability (Cronbach's alpha)
D Most	0.78
I Most	0.72
S Most	0.72
C Most	0.74
D Least	0.83
I Least	0.74
S Least	0.70
C Least	0.71
D Overall	0.88
I Overall	0.84
S Overall	0.82
C Overall	0.82

Table 9: Reliability of the new PPA form

2.5.3.2 Equivalence between new and original PPA form

One way of supporting equivalence between different forms of an assessment is through strong correlations of scores on people taking both forms. As the original 24 PPA items were included in this study, it is possible to conduct these correlations on this sample. These can be seen in table 10. Based on EFPA guidelines, equivalence is supported where median scale correlation is above .70 (Evers et al., 2013). Median scale correlation for overall scales is .84 and for subscales is .77, supporting the equivalence of the old and new PPA forms.

Scale	PPA / New PPA
D Most	0.84
I Most	0.79
S Most	0.75
C Most	0.63
D Least	0.83
I Least	0.80
S Least	0.75
C Least	0.69

D Overall	0.89
I Overall	0.86
S Overall	0.82
C Overall	0.74

Table 10: Correlations supporting the equivalence of the old and new PPA forms

2.6 Scoring and Reporting

The PPA assessment has 24 items, each comprising of four descriptives, one relating to each of the four factors. When completing the PPA, assessment takers respond to each item by selecting the descriptive that they consider to be "most like them" and the descriptive that they consider to be "least like them", resulting in 48 responses.

"Most like me" responses for each of the factors are totalled, giving a "most" score for each factor that ranges from 0–24 with the sum of all factor scores being 24. The same is done for "least like me" scores, giving similar "least" scores for each factor. Finally, for each factor the "least" score is subtracted from the "most" score, resulting in an overall score from each factor that ranges from -24 to 24 with the sum of all factor scores being 0.

Worked example

Participant responses:

Response	D	I	S	C
Most like me	4	5	5	10
Least like me	10	10	4	0

Sum of "most" scores = 4 + 5 + 5 + 10 = 24; Sum of "least scores = 10 + 10 + 4 + 0 = 24

Calculation of overall scores:

	D	I	S	C
Calculation	4 - 10	5 - 10	5 - 4	10 – 0
Total	-6	-5	1	10

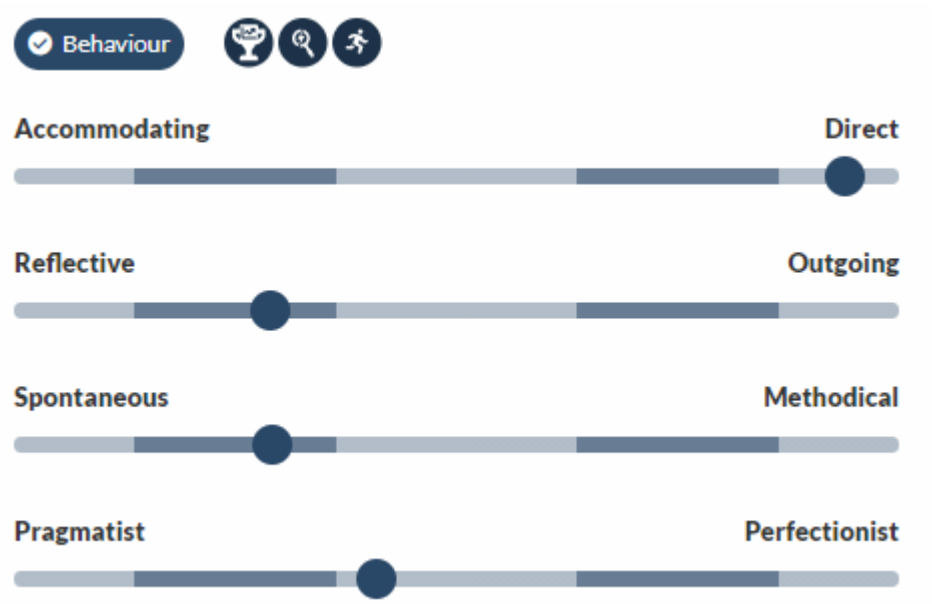
Sum of overall scores = -6 + -5 + 1 + 10 = 0

In PPA parlance, a positive overall factor score (0 or above) is considered a working strength, suggesting that the assessment taker has a preference for behaviour relating to this factor. In the example above, Compliance and Steadiness would be considered working strengths. A negative overall factor score is considered a support factor, suggesting the assessment taker has a preference away from behaviour relating to this factor. In the example, Dominance and Influence are considered support factors. The further away from 0 the overall score is for a factor, the more apparent the preference is. For example, whilst Compliance and Steadiness are both working strengths, Compliance is much further from 0 and so indicates a much stronger preference in behaviour. The strongest working strength is often called the leading factor (in this case, Compliance). The PPA profile is often used to simplify scores, by listing the working strengths in preference order. In the above example, this would be a CS profile, as C and S are working strengths, C is higher and S is second.

How PPA scores are reflected in reporting depends somewhat on the platform and on the context and intended user of the specific report.

The new Thomas Perform system is aimed at being very user-friendly with assessment content being made as accessible as possible. Users are presented with a visual representing overall PPA scores on each factor. Instead of factor names, descriptives are provided to reflect the types of behaviour that would be observed at each end of the scale (high scores are on the right, the

factors are ordered D, I, S then C). Numerical representations of scores are not included. An example can be seen below.



Report content is presented for each of the factors separately. Content is split into four bandings, very high, high, low, very low depending on the assessment takers' score. Content is structured into outcomes based on intended use case, such as communication style, decision making, how to onboard and leadership style.

In the original Thomas Hub platform, up to 23 different reports are available (depending on language with all being available in English to all users). How scores are reflected in reports varies by report. Some of the reports have been designed to be accessible to wider audiences, such as the Candidate Feedback Report intended for assessment takers and the Onboarding report intended for new managers. These reports have descriptive content based on the PPA profile as described above, that is intended for readers who don't have prior knowledge of the PPA.

There are also specific reports such as the Sales Audit Report and Leadership Skills Report which are written with a very specific use case in mind. These are again intended for readers who don't necessarily have prior knowledge of the PPA, though they are equally useful for those that have. Report content is again based on PPA profile.

Finally, there are technical reports intended for users who have been trained in the PPA assessment, such as the Executive Summary report and the Graphs and Scores report. These reports include more technical information such as scores for most, least and overall and include information drawn from the three types of scoring picking up on things such as consistency across the three types of scores.

2.7 Localisation Process

The following is the localisation process taken each time a new translation of the PPA is created.

Step 1: Support is provided by a native speaker of the translation language who is also fluent in English. This is sometimes carried out through a translation agency.

Step 2: PPA adjectives for each factor are translated and back translated by the native speaker/s to ensure they have the correct meaning. Any errors in words are also checked for. The total number of PPA quads translated is 79 (316 adjectives) with 24 quads used in the final translation

(96 adjectives). The 79 quads are the same as the ones which were identified and tested in Section 2.5.2 during the creation of the new English PPA form.

Step 3: The 79 translated quads are entered into a survey and at least 100 native speakers complete the translated version of the PPA. There is also space for comments and feedback on any words they believe did not make sense or should be changed.

Step 4: Once more than 100 native speakers complete the translated version of the PPA we run statistical analysis checking for reliability alphas and correlations between each scale. We ensure alphas for each scale are >.70 and ensure scale correlations are in line with what we theoretically assume (i.e., opposing factors on the two dimensions should negatively correlate somewhat: dominance/steadiness, influence/compliance). For the analysis, the PPA quads are tested in different combinations (approx. 10,000) in order to find the strongest final translation with 24 quads.

Step 5: The final list of PPA adjectives is sent to the individual/s who translated the assessment to check for any mistakes such as spelling or grammar. At this point they are unable to change the words. If there are any serious concerns about any of the words then step 1 may have to be restarted for re-validation.

Step 6: Once the translator confirms they are happy with the final PPA adjectives, we pass the translated PPA over to our internal team who are responsible for uploading the new translation to the online platform.

3.0 Research

3.1 Reliability

3.1.1 Internal Consistency

Study 3.1.1.1

To test the internal consistency of the PPA, a study was carried out in 2019 using the new PPA form with 199 participants who were incentivised to participate by being given insights into their behavioural preferences based on the PPA. Participants were recruited from people who had taken an assessment with Thomas International for genuine test use.

Based on the sample, means, standard deviations, Cronbach's alphas reliability statistics and standard error of measurement statistics were calculated for each factor. These can be seen in table 11.

Factor	Mean	sd	α	SeM
D	-2.8	8.9	**0.90**	2.8
I	0.0	8.0	**0.86**	3.0
S	2.4	6.8	**0.82**	2.9
C	0.2	7.3	**0.83**	3.0

Table 11: Scale descriptives, reliabilities and standard error of measurement for each of the four PPA factors

Median scale alpha was 0.82. This provides strong support for the reliability of the PPA.

Study 3.1.1.2

A separate study was carried out in 2019 using the new PPA form with 197 participants who were also incentivised to participate by being given insights into their behavioural preferences based on the PPA. Participants were recruited from people who had taken an assessment with Thomas International for genuine test use.

Based on the sample, means, standard deviations, Cronbach's alphas reliability statistics and standard error of measurement statistics were calculated for each factor. These can be seen in table 12.

Factor	Mean	sd	α	SeM
D	-0.9	9.3	**0.90**	3.0
I	-0.9	7.5	**0.84**	3.0
S	1.4	7.0	**0.82**	3.0
C	0.2	6.9	**0.81**	3.0

Table 12: Scale descriptives, reliabilities and standard error of measurement for each of the four PPA factors

Median scale alpha was 0.83. This provides strong support for the reliability of the PPA.

It is important to note that the participants in Study 3.1.1.1 and Study 3.1.1.2 varied although both apart of a group of individuals who has taken a Thomas International assessment for genuine test use. Because the participants differ, means and standard deviations vary as shown in between DISC factor scores in Table 11 and Table 12.

Study 3.1.1.3

In 1983, a study on the original PPA form was carried out on a sample of 271 people. Alpha coefficients were calculated and are shown in Table 13. The equivalence of the old and new PPA

forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2).

Factor	α
D	0.78
I	0.71
S	0.74
C	0.62

Table 13: Reliability of the PPA factors

While descriptive statistics are not available in this archived study and so standard error of measurement cannot be calculated, with a median alpha of 0.73, this study demonstrates the consistent reliability of the PPA since its original development.

Study 3.1.1.4

A study in July and August 2020 was used to assess the internal consistency of the new PPA form. 429 participants completed the PPA who were also incentivised to participate by being given insights into their behavioural preferences based on the PPA. Participants were recruited from people who had taken an assessment with Thomas International for genuine test use. Alpha coefficients were calculated and are shown in Table 14.

Factor	Mean	sd	α	SeM
D	-1.5	8.9	0.89	2.9
I	-0.3	7.4	0.83	3.1
S	1.7	6.8	0.82	2.9
C	-0.1	6.5	0.79	3.0

Table 14: Scale descriptives, reliabilities and standard error of measurement for each of the four PPA factors

Median scale alpha was 0.83. This provides strong support for the reliability of the PPA.

Study 3.1.1.5

A study in September and October 2020 was used to assess the internal consistency of the new PPA form. 202 participants completed the PPA who were also incentivised to participate by being given insights into their behavioural preferences based on the PPA. Participants were recruited from people who had taken an assessment with Thomas International for genuine test use. Alpha coefficients were calculated and are shown in Table 15.

Factor	Mean	sd	α	SeM
D	-1.2	9.3	0.90	2.9
I	-0.3	8.0	0.86	3.0
S	1.7	7.3	0.84	2.9
C	-0.4	6.9	0.83	2.9

Table 15: Scale descriptives, reliabilities and standard error of measurement for each of the four PPA factors

Median scale alpha was 0.85. This provides strong support for the reliability of the PPA.

3.1.2 Test-Retest

Study 3.1.2.1

In 2020, 200 participants took the PPA at two separate time periods, with a mean of 7.2 weeks from one another (ranging from 5.0 weeks to 8.7 weeks). Participants had previously volunteered to take part in psychology research following taking an assessment with Thomas International for genuine test use and were incentivised to take part in exchange for insights into their behavioural preferences. Pearson's correlations were then run between the first and second scoring of each factor (Dominance, Influence, Steadiness and Compliance) in the PPA. Descriptives based on both test and retest assessments, test-retest correlations and standard error of measurements are show in table 16.

Factor	Mean	Pooled sd	r	SeM
D	-1.3	9.4	0.91	2.8
I	-0.5	7.8	0.87	2.8
S	1.9	7.2	0.88	2.5
C	-0.2	6.7	0.83	2.8

Table 16: Scale descriptives, test-retest correlations and standard error of measurement for each of the four PPA factors

Median factor test-retest coefficient was .88 suggesting solid test-retest reliability.

Study 3.1.2.2

Between 2013 and 2020, 239 participants took the PPA at two separate time periods roughly 6 months apart (mean = 187 days, range 168-220 days). The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). Participants had all taken the assessments for genuine test use through clients of Thomas International. Correlations were then run between the first and second scoring of each facet (Dominance, Influence, Steadiness and Compliance) in the PPA. Descriptives based on both test and retest assessments, test-retest correlations and standard error of measurements are show in table 17.

Factor	Mean	Pooled sd	r	SeM
D	-1.6	6.9	0.82	2.9
I	1.7	4.5	0.73	2.4
S	-0.5	5.1	0.77	2.4
C	-0.9	4.0	0.75	2.0

Table 17: Scale descriptives, test-retest correlations and standard error of measurement for each of the four PPA factors

In this non-experimental study based on genuine assessment results the median factor coefficient was 0.76 providing strong support for the test-retest reliability of the PPA.

Study 3.1.2.3

Between 2013 and 2020, 260 participants took the PPA at two separate time periods roughly a year apart (mean = 382 days, range 300-443). The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). Participants had all taken the assessments for genuine test use through clients of Thomas International. Correlations were then run between the first and second scoring of each facet (Dominance, Influence, Steadiness and Compliance) in the PPA. Descriptives based on both test and retest assessments, test-retest correlations and standard error of measurements are show in table 18.

Factor	Mean	Pooled sd	r	SeM
D	-1.6	6.9	0.80	3.1
I	1.9	4.6	0.75	2.3
S	-0.8	5.3	0.73	2.8
C	-0.8	4.1	0.75	2.1

Table 18: Scale descriptives, test-retest correlations and standard error of measurement for each of the four PPA factors

In a longer time period, this non-experimental study based on genuine assessment results the median factor coefficient was 0.75 providing strong support for the test-retest reliability of the PPA.

3.1.3 Reliability Summary

8 studies have been presented above based on 1726 participants, 7 with full descriptive statistics and standard error of measurements. 6 studies are based on experimental research whilst 2 are based on assessment takers completing the PPA for genuine test use. 5 studies look at internal consistency whereas 3 look at test-retest reliability. In order to summarise reliability statistics, weighted means, pooled standard deviations, weighted median reliabilities were calculated for each of the 4 PPA factors. Standard error of measurements were estimated based on these data. This information is summarised along with median reliability and standard error of measurement in Table 19.

Factor	n	Weighted Mean	Pooled sd	Weighted Median Reliability	Estimated SeM
D	1726	-1.3	8.6	0.89	2.8
I	1726	0.2	7.0	0.83	2.9
S	1726	1.0	6.5	0.82	2.8
C	1726	-0.3	6.2	0.79	2.8
Median				0.82	2.8

Table 19: Summarised means, standard deviations, reliabilities and standard error of measurement aggregated from 7 previously reported studies.

There has been academic criticism of the use of Cronbach's alphas to infer reliability of ipsative measure (e.g., Tenopyr, 1988), though there is also evidence to support that ipsative assessments are not inherently less reliable than normative ones (Saville & Willson, 1991). When evaluating the entirety of the evidence supporting the reliability of the PPA, the similarities between test-retest reliability and Cronbach's alphas give confidence that reliability estimates have not been inflated if differing approaches give similar outcomes.

3.2 Validity

3.2.1 Construct Validity

Study 3.2.1.1 – PPA Confirmatory Factor Analysis

In 2019, a study was carried out to assess the two dimensional factor structure underlying the PPA. Further information about the PPA theory and model can be seen in section 2.1.2 and in Diagram 1 in this manual. Table 20 below shows the relationship between the two dimensions and the four PPA factors.

Factor	Environment Dimension	Reaction Dimension
Dominance	Antagonistic	Active
Influence	Favourable	Active

Steadiness	Favourable	Passive
Compliance	Antagonistic	Passive

Table 20: The relationship between the two PPA dimensions and four factors

199 participants were recruited from a panel of individuals who had opted in to take part in psychological research following completing a psychometric assessment with provider Thomas International. All originally completed assessments in English in an English-speaking country. 52% were from the UK, 21% from South Africa, 7% from Canada and 21% from other countries. Mean participant age was 40 (range 20-66). Participants were offered insights into their behavioural preferences based on the PPA as an incentive to take part.

To assess the two dimensional factor structure of the PPA, a confirmatory factor analysis (CFA) was carried out on the sample using the Lavaan package (Rosseel, 2012; version 0.5-20). For parameter estimation, maximum likelihood with robust standard errors was used as data were not normally distributed. Results can be seen in table 21.

Model	χ^2	df	p value	χ^2/df	CFI	TLI	RMSEA	SRMR
PPA	2022	1079	0.000	1.874	0.715	0.702	0.066	0.067

Table 21: PPA Model fit based on a CFA

Fit indices reported are based on Kline's (2005) recommendations. A good fit was seen in terms of the χ^2/df ratio, the RMSEA and the SRMR. Both the CFI and TFI were below levels expected for good fit. Overall, reasonable fit for the PPA was found, especially considering the RMSEA, supporting the construct validity of the assessment.

Study 3.2.1.2 – PPA Factor and Item Score Correlations

In 2020, a study was conducted with a sample of 202 participants who had been recruited from people who had previously taken assessments with Thomas International for genuine test use and who were incentivised by insights into their behavioural preferences.

For each factor, overall scores were correlated with item scores on each of the 24 items. Results can be seen in Table 22.

Item	D	I	S	C
1	0.49	0.14	0.53	0.49
2	0.36	0.64	0.20	0.61
3	0.64	0.55	0.20	0.31
4	0.57	0.63	0.57	0.28
5	0.53	0.48	0.64	0.45
6	0.54	0.44	0.37	0.47
7	0.54	0.45	0.32	0.16
8	0.23	0.23	0.21	0.34
9	0.51	0.55	0.46	0.33
10	0.49	0.30	0.66	0.36
11	0.32	0.66	0.45	0.44
12	0.51	0.37	0.53	0.39
13	0.36	0.31	0.50	0.14
14	0.27	0.63	0.39	0.69
15	0.50	0.38	0.38	0.49
16	0.73	0.39	0.40	0.34
17	0.66	0.41	0.50	0.45
18	0.65	0.54	0.45	0.55

19	0.60	0.57	0.48	0.42
20	0.57	0.48	0.41	0.33
21	0.58	0.51	0.52	0.53
22	0.52	0.34	0.43	0.50
23	0.51	0.38	0.42	0.49
24	0.65	0.53	0.47	0.48

Table 22: Scale and item correlations for each of PPA factors. All correlations are significant at the P < 0.05 level.

All item scores statistically significantly correlated with scales scores for each factor at the P<0.05 level. Mean scale/item correlation was 0.46 with a standard deviation of 0.13 (range 0.14 – 0.73). This suggests that the PPA factors are not overly narrow, supporting the content validity of the factors. More broadly these data support the construct validity of the PPA.

Study 3.2.1.3 – PPA and Demographic Characteristics

The following group of studies were carried out in October 2020 and were used to test for differences between groups where differences would not be expected. These groups include demographic characteristics Gender, Age, Ethnicity and Education. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). This analysis has been used to check that the PPA scales are not biased towards or against members of certain groups.

Gender

T tests were used to test for differences in PPA factor scores between Males and Females. Data was extracted from 61,076 individuals. As there are no gender differences in personality, it was expected that no differences would be found in scores between Males and Females. Table 23 shows the results.

	Dominance			**Influence**			**Steadiness**			**Compliance**		
	d	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***
Gender	-0.28	-34.38	<.001	0.09	11.24	<.001	0.29	34.99	<.001	-0.00	-0.29	>.05

Table 23: Effect size, t and significance values for each factor.

Analysis showed negligible effect sizes between male and female factor scores for both Influence and Compliance. Small effect sizes were discovered for both Dominance and Steadiness. Females were more likely to have lower Dominance scores and higher Steadiness scores compared to Males. Further analysis has been carried out to understand the effect size for the Dominance and Steadiness scores in more detail and to check for gender bias within the scale itself (See Study 3.2.1.5).

Age

Pearson's Product Moment Correlational analysis was used to test for a relationship between respondent age and PPA factor scores. Data was extracted from 61,076 individuals. As personality remains relatively stable throughout the lifespan, and the prevalence of PPA profiles are evenly distributed across the UK, we would not expect to see a correlation between PPA factor scores and age of the respondent. Results are shown in Table 24.

	D	**I**	**S**	**C**
Age (Years)	0.03***	-0.03***	-0.01***	0.03***

Table 24: Correlation Coefficients for each PPA factor and age. (= <.05, **=<.01, ***=<.001)*

The analysis showed negligible correlations across all four factors. This demonstrates that respondent age does not impact the score on each PPA factor scale.

Ethnicity

A one-way ANOVA was used to test for differences in PPA factor scores between different ethnic groups. Data was extracted from 59,702 individuals who had both completed the PPA and provided their ethnic information. There is no evidence to suggest there would be differences between ethnic groups in behavioural characteristics and ethnicity should not predict PPA factor scores. It was theorised that there would be no meaningful differences between ethnic group and scores on each PPA factor. Results are shown in Table 25.

	Sum of Sq	DF	Mean Sq	F	Sig.	Eta.Sq
D~Ethnicity	9547	14	681.93	20.59	<.001	0.005
I~Ethnicity	9294	14	663.83	40.32	<.001	0.009
S~Ethnicity	2390	14	170.72	7.84	<.001	0.002
C~Ethnicity	3854	14	275.25	21.14	<.001	0.005

Table 25: Effect size, t and significance values for each PPA factor.

Analysis revealed significant relationships between Ethnicity and the four PPA factor scales, however all effect sizes were negligible according to Cohen's conventions (Cohen, 1988). This demonstrates that respondent ethnicity does not impact the resulting score on each PPA factor scale.

Education

T tests were used to test for differences in PPA factor scores between those with different educational backgrounds. Data was extracted from 61,076 individuals who had completed the PPA for selection and development purposes. The study specifically looked at those with a degree and those without. It would not be expected that those with various levels of education would show a difference in PPA factor scores. Results are shown in Table 26.

The table below shows effect size, t and significance values for each PPA factor:

	Dominance			**Influence**			**Steadiness**			**Compliance**		
	d	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***
Education	.14	17.02	<.001	-.02	-3.02	<.001	-.15	-18.11	<.001	-0.03	-4.11	<.001

Table 26: Effect size, t and significance values for each PPA factor.

Effect sizes demonstrate that respondent education level, namely those who have a degree compared to those without, does not impact the resulting score on each PPA factor scale.

Study 3.2.1.4 – Fairness and PPA: case study

In order to ascertain whether the PPA was free from bias, a study was carried out with a UK-based recruitment company in 2018. All applicants for recruitment roles over a 12-month period took the PPA as part of the recruitment process and completed a demographic questionnaire (n=265). The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). Table 27 shows the results.

		Effect Size *d* (significance)			
Group	**n**	**D**	**I**	**S**	**C**
Gender (Female/Male)	265	-0.14 (p=0.129)	-0.07 (p=0.289)	0.06 (p=0.314)	0.17 (p=0.095)
Ethnicity (BAME/White)	186	-0.06 (p=0.353)	-0.06 (p=0.360)	-0.13 (p=0.205)	0.18 (p=0.122)

Table 27: Cohen's d Effect Sizes and T Test Significance Values for each PPA Factor between Different Groups

No PPA factor scores were found to be statistically significantly different ($p<0.05$) or of a meaningful effect size ($d>0.2$) between women and men or between BAME people and white people. This supports that the PPA is free from bias. By not finding any biases in a specific sample from one controlled occupational context, this suggests that gender differences found in the study above are likely to be artifacts of differing job demands of roles more frequently taken up by one gender than the another.

Study 3.2.1.5 – DIF

In 2020, in order to ascertain whether the PPA items themselves contained bias a differential item functioning analysis (DIF) was conducted on data from 338 participants who had completed the PPA in return for insight into their behavioural preferences. 57% were female with the remaining 43% male and 85% were white and 15% were from ethnic minorities.

Logistic regressions are commonly used to evaluate DIF (e.g. Cuevas & Cervantes, 2012), but PPA item scores are not suitable for this as item scores are not binary due to participants being able to respond as both most and least like themselves. As a result, the method chosen for assessing DIF was based on evaluating several regression models as shown below:

Model 1: Item Response = b_1*Scale Score + b_2*Protected Characteristic + b_3*Interaction + c

Model 2: Item Response = b_1* Scale Score + b_2* Protected Characteristic + c

Model 3: Item Response = b_1* Scale Score + c

Analysis was conducted for each of the four adjectives on each of the 24 items for both gender and ethnicity. Item Response is how the participant responded to that word on that item (1 = selected as most like them, 0 = didn't select this adjective, -1 = selected as least like them). Scale Score is participants' overall score on the PPA scale the adjective corresponds to. Protected Characteristic is a numeric value corresponding to participants' group identity under study (2 = female, 1 = male, 2 = ethnic minority, 1 = white). Interaction is Scale Score multiplied by Protected Characteristic.

A statistically significant difference of a meaningful effect size between model 2 and 3 would indicate uniform DIF and a statistically significant difference of a meaningful effect size between model 1 and 2 would indicate non-uniform DIF. ANOVA analyses were conducted for each evaluation with $p<0.05$ indicating a significant result. The preferred approach to evaluating effect sizes between models was using R2Δ (Zumbo, 1999) with R2Δ>.035 being considered a moderate effect size and R2Δ>.07 being large (Jodoin & Gierl, 2001).

From the 192 evaluations completed only one identified potential differential item functioning. The Steadiness adjective "Compassionate" was selected more frequently by women than by men when their overall Steadiness score was controlled for (uniform DIF indicated by model 2 and model 3 R2Δ = .048, p=0.000). Given that no other meaningful differences were found for gender, the impact of one adjective on one item on overall PPA scores would be negligible. There were no meaningful differences found by ethnicity.

This research supports that the PPA is free from item-level bias.

Study 3.2.1.6 – PPA with the Interpersonal Circumplex and aspects of Socioanalytic Theory

Marton's (1928) original two dimension model (favourable/unfavourable, active/passive) that gives rise to the four PPA factors bears similarities to other theoretical concepts. This study aims to compare the PPA to conceptually divergent models with clear theoretical overlap.

Socioanalytic Theory (SAT) was first proposed by Hogan (1982). The theory posits that there is an evolutionary advantage to firstly to being in a group rather than being alone, and secondly to achieving status within that group in order to increase change of reproducing. This has led to an inherent motivation for people to get along by achieving acceptance from others and to get ahead by achieving status in groups (see Hogan & Blickle, 2017). In social interactions, our behaviour is governed by our perception of our acceptance (e.g. with a friend or rival) and status within the dynamic (e.g. with a supervisor or subordinate) and our motivation not to lose acceptance or status (Hogan & Roberts, 2000). SAT describes behaviour in terms of the pursuit of inherent motivations whereas the PPA describes behaviour in terms of responses to perceptions of situations. Despite this, there are clear similarities firstly between perceptions of acceptance in a social situation in SAT and perceptions of how friendly or favourable a situation is in the PPA; and secondly perceptions of status in a social interaction in the SAT and perceptions of relative intensity or relative advantage in a situation in the PPA.

The Interpersonal Circumplex (IPC) was based on original work by Kaiser Foundation Group aiming to define a comprehensive schema for personality that would equally describe adjustive and maladjustive behaviour (Freedman, Leary, Ossorio & Coffey, 1951). The group's research, based on observations of interpersonal behaviour, ordered behaviours based on their relation to two dimensions: firstly, a dimension relating to power on a scale from dominance or strength to submission or weakness and, secondly, a dimension relating to affiliation on a scale from hostility to affection. The IPC describes individual's motivators based on their behaviours and again there are clear similarities to the PPA. The IPC's affiliation dimension bares similarities with the PPA's perception of a situation as either friendly (affection in the IPC) or hostile (hostility). Similarities are also evident between the power dimension and the PPA's perception of the relative intensity or advantage a person has in a given situation.

For the present study, 199 participants were recruited in 2019 from a panel of individuals who had opted in to take part in psychological research following completing a psychometric assessment with provider Thomas International. All originally completed assessments in English in an English-speaking country. 52% were from the UK, 21% from South Africa, 7% from Canada and 21% from other countries. Mean participant age was 40 (range 20-66). Participants were offered insights into their personality based on the measures as an incentive to take part.

Along with the PPA, the measure of the IPC used was the IPIP-IPC as it was found to have good reliability and factor structure (Markey & Markey, 2009). Participants responded to 32 statements on a 1-5 Likert scale based on how accurate they felt the statement represented them. In a similar manner to the PPA, questions load onto specific positions on the on two-dimension model. Warmth and dominance scale scores were calculated according to the original papers' formulae.

A workplace measure of getting along and getting ahead based on socioanalytic theory was created with 8 items on each scale. An example getting along item was "Collaboration is the best way to get work done" and an example getting ahead item was "I want to do better than my peers". Participants responded with agreement to the statements on a 1-7 Likert scale. Scale scores were calculated by summing responses. An exploratory factor analysis suggested a model with two orthogonal factors. This model accounted for 34% of the variance in the data. Scale reliabilities from Cronbach's alphas were acceptable (getting along α =.66, getting ahead α=.68).

Participant scale scores on the PPA (Active and Favourable), the IPC (Dominance and Warmth) and the workplace socioanalytic measures (Getting Along and Getting Ahead) were all normally distributed so Pearson's correlation coefficients were calculated. A correlation matrix can be seen in Table 28.

	PPA: Active	PPA: Favourable	SAT: Getting Ahead	SAT: Getting Along	IPC: Dominance	IPC: Warmth
PPA: Active						

PPA: Favourable	-0.04					
SAT: Getting Ahead	**0.48*** **	-0.23***				
SAT: Getting Along	-0.03	**0.47*** **	-0.07			
IPC: Dominance	**0.62*** **	0.01	0.27***	0.03		
IPC: Warmth	0.14*	**0.53*** **	-0.01	0.62***	0.06	

*Table 28: Correlations between the PPA, IPC and workplace SAT measures (*** indicates p<.001, ** indicated p<.01, * indicates p<.05)*

The correlation matrix firstly shows that the two dimensions in each measure didn't correlate significantly (PPA r=-.04 p=.606; SAT r=-.07 p=.335; IPC r=.06 p=.379). This would be expected given the orthogonal nature of the dimensions.

The PPA Active dimension significantly strongly correlated with the SAT Getting Ahead scale (r=.48, p<.001) and the IPC Dominance scale (r=.62, p<.001). Furthermore, the PPA Favourable dimension significantly strongly correlated with the SAT Getting Along scale (r=.47, p<.001) and the IPC Warmth scale (r=.53, p<.001).

These strong correlations between the two PPA dimensions to similar yet conceptually distinct scales in both the workplace socioanalytic measure and the IPC provide solid support to the construct validation of the PPA.

Study 3.2.1.7 – PPA and Ipsative Big 5 Measure

In 2019, in order to support the construct validity of the PPA by understanding the relationship between underlying personality and behavioural preferences, 197 participants took the PPA and an ipsative version of the five factor model mini-IPIP (Donnellan et al., 2006). An ipsative version of the five factor model was used to control for any biases in response styles that might be associated with particular behavioural preferences (for example, highly compliant participants being naturally more cautious and indecisive and so potentially less likely to use the extremes of the scales). 40 questions were created from pairs of Donnellan et al.'s original 20 questions (both a positively coded and negatively coded pair of each potential factor combination) and participants were asked to respond with which statement they agreed with most. Participants were those who volunteered to take part in psychology research and were incentivised through insights into their behavioural preferences.

It was hypothesised that the strongest relationship with high dominance would be with low agreeableness as these individuals are more competitive, domineering and ruthless. Modest positive correlations were hypothesised with assertiveness aspects of extraversion and achievement-striving aspects of conscientiousness. For influence, the strongest relationship was expected to be with extraversion as both relate to being sociable and gregarious. Steadiness was expected to be strongly, positively correlated with agreeableness, as both relate to being trusting, cooperative and sympathetic. Finally, compliance was expected to have a negative correlation with emotional stability as compliant individuals are more cautious and nervous, as well as to have a positive correlation with the diligence aspects of conscientiousness. Results are shown in Table 29.

	D	I	S	C
Openness	0.07	-0.28	-0.05	0.25
Conscientiousness	0.18	-0.45	-0.20	0.44
Extraversion	0.10	0.64	-0.25	-0.56
Agreeableness	-0.52	-0.08	0.63	0.16
Emotional Stability	0.09	0.15	-0.02	-0.25

Table 29: Correlation Coefficients for the Big-5 traits and PPA factors.

As hypothesised, dominance has a moderate negative correlation with agreeableness (r = -0.52). This relationship is logical with high dominance Individuals often considered to be reckless, they are competitive, direct, straightforward and blunt. Expected correlations with extraversion (r = 0.10) and conscientiousness (r = 0.18) were more modest, potentially suppressed by the ipsative nature of the big five assessment. Influence, on the other hand, has a moderate-to-high positive correlation with extraversion (r = 0.64) as hypothesised. This relationship follows as those high in influence are described to be outgoing, persuasive, gregarious, optimistic and interested in people. Influence also has an unexpected moderate negative correlation with conscientiousness (r = -0.45). Negative correlations such as these are likely coerced by the nature of the ipsative big five.

Steadiness has a moderate-to-high positive correlation with agreeableness (r = 0.63) as hypothesised. This relationship is logical as those high in steadiness are described to be amiable, easy going, contented, patient, and strive to maintain the status quo. Finally, compliance has a hypothesised, moderate, positive relationship with conscientiousness (r = 0.44). This relationship holds up as those high in compliance are described as strive for stability and order, follow procedures, and have a high attention to detail. Compliance in the PPA also has a moderate negative correlation with extraversion. This again is potentially an artifact of ipsative measures. Compliance also had a modest, hypothesised, negative correlation with emotional stability (r = -0.25).

Through providing understanding of the relationship between personality and behavioural preferences, this study provides strong support for the construct validity of the PPA.

Study 3.2.1.8 - PPA and Dark Side Personality

In 2020, 191 participants were involved in a study that measured the relationship between the PPA dimensions and the Dark Triad. It was hypothesised that individuals who scored high on dark side traits would be more likely to have developed more extreme active behavioural preferences, either through high dominance and/or influence, as they are more likely to be motivated to control their environments.

Participants took the PPA to measure their behavioural preferences and took the Short Dark Triad to measure Machiavellianism, Narcissism, and Psychology (Jones & Paulhus, 2014). Participants were those who volunteered to take part in psychology research and were incentivised through insights into their behavioural preferences.

The strongest consistent relationships was seen between Narcissism and the PPA (dominance r=0.26, influence r=0.35, steadiness -0.40 and compliance -0.33) which confirms our initial hypotheses. Findings for Psychopathy and Machiavellianism provided some more limited support for our hypothesis. The hypothesis that dark side traits are more likely to lead to active behavioural preferences is supported. This provides support for the construct validity of the PPA. Table 30 shows the results.

Correlation	D	I	S	C
Machiavellianism	0.18	-0.05	-0.19	0.01
Narcissism	0.26	0.35	-0.4	-0.33
Psychopathy	0.29	0.01	-0.31	-0.09

Table 30: Correlation Coefficients between the PPA factors and Dark Side traits.

Study 3.2.1.9 - PPA with 16PF and OPQ

In 1985, initial PPA construct validity was carried out in the UK exploring the relationship between PPA behavioural preferences and personality measures. 263 subjects completed the PPA, the 16PF (Cattell, 1949), which is a self-report questionnaire measuring 16 dimensions of personality, and the Occupational Personality Questionnaire (OPQ, Saville et al., 1984). The version used in

this study was FM3, containing 90 test items covering 14 person dimensions and one social desirability scale. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2).

On the 16PF, it was hypothesised that PPA dominance would be positively correlated to dominance, influence would be positively correlated to liveliness and social boldness, steadiness would be negatively correlated to dominance and compliance would be negatively correlated to liveliness and social boldness. Further, on the OPQ it was hypothesised that PPA dominance would be positively correlated with vigorous, competitive, decisive, innovative and variety seeking, influence would be positively correlated with persuasive, outgoing, socially confident and optimistic, steadiness would be positively correlated with modest, caring and conventional and negatively correlated with controlling, outgoing, vigorous and competitive and compliance would be positively with detail conscious, worrying and modest and negatively correlated with socially confident, outgoing and controlling. Table 31 shows the results.

	Dominance	Influence	Steadiness	Compliance
16PF	+.55 Dominance +.33 Abstractedness -.33 Apprehension -.30 Privateness	+.51 Liveliness +.40 Social Boldness -.35 Self-Reliance	+.31 Apprehension -.46 Dominance -.36 Liveliness	-.42 Liveliness -.40 Social Boldness -.32 Dominance
OPQ	+.56 Competitive +.53 Decisive +.50 Persuasive +.49 Variety Seeking +.39 Innovative +.33 Affiliative +.31 Relaxed +.31 Vigorous	+.64 Outgoing +.34 Socially Confident +.30 Optimistic	+.31 Caring +.35 Modest -.54 Competitive -.50 Decisive -.49 Controlling -.46 Conventional -.36 Outgoing -.32 Socially Confident -.31 Vigorous	+.35 Detail conscious +.34 Modest -.50 Outgoing -.10 Decisive -.37 Socially Confident -.17 Controlling -.32 Optimistic

Table 31: Correlation Coefficients for the four the PPA factors, the 16 Primary factors and the 15 Occupational Personality Questionnaire scale.

Findings were largely in line with hypotheses with some very convincing correlations. In the 16PF, expected relationships were found as well as several others that would still theoretically agree such as Apprehension and Dominance. With the PPA being an ipsative measure, a high score in one factor comes at a reduction in scores in other factors and so a negative relationship between Apprehension and Dominance is likely reflecting that people high in Dominance likely score low in Steadiness and Compliance, factors that would theoretically more neatly align with Apprehension. On the OPQ, findings again followed what would be theoretically expected with few exceptions. Notably Persuasive on the OPQ correlates much more strongly with Dominance rather than Influence on the PPA likely reflecting a differing way of persuading and influencing.

Overall, these data strongly support the relationship between prominent personality measures driving preferences in behavioural style demonstrated in the PPA. This also provides support for the construct validity of the PPA.

Study 3.2.1.10 - PPA with Eysenck Personality Questionnaire

In 1998, to further demonstrate the construct validity of the PPA, 166 participants took the PPA and the Eysenck Personality Questionnaire (Eysenck, 1975) to explore the relationship between personality and behavioural preferences. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2).

It was hypothesised that PPA dominance would be positively correlated with aggressive, assertive, achievement-orientated and risk taking and negatively correlated with anxious and lack

or autonomy, influence would be positively correlated with achievement-orientated, sociable and impulsive and negatively correlated with anxious, steadiness would be positively correlated with anxious and negatively correlated with risk-taking, assertive and aggressive and compliance would be positively correlated with anxious and negatively correlated with achievement-orientated, impulsive and risk taking.

Results are shown in Table 32.

Dominance	Influence	Steadiness	Compliance
+.30 Aggressive +.28 Risk-taking +.22 Lack of autonomy -.43 Anxious	+.25 Impulsive +.23 Risk-taking +.21 Achievement-oriented -.45 Anxious	+.48 Anxious -.31 Risk-taking -.30 Aggressive -.20 Impulsive	+.54 Anxious -.37 Risk-taking -.29 Achievement-oriented -.25 Impulsive

Table 32: Correlation Coefficients between the PPA factors and the EPQ.

Findings strongly aligned with hypotheses. Most expected relationships between were found between he EPQ and the PPA. Assertive was not related to Dominance and Steadiness as expected, but Aggressive did. By and large findings provided strong support for the PPA construct.

Study 3.2.1.11 - PPA with High Potential Trait Indicator

To test for construct validity, in September 2020 data was extracted from 5,333 individuals who completed the PPA and High Potential Trait Indicator (HPTI) for employee selection and development purposes in the UK. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). The HPTI is a self-report personality assessment based upon the Big 5 personality traits with six core traits: Conscientiousness, Adjustment, Curiosity, Risk Approach, Ambiguity Acceptance and Competitiveness (MacRae & Furnham, 2014). The traits in the HPTi have been designed and adapted from the Big Five but focusing on only what is necessary in the workplace. Although they correlate strongly with the Big Five traits, each trait is measuring a narrower, more specific set of constructs (MacRae & Furnham, 2014). It would be expected that the PPA factors and the HPTI traits show some correlations due to them both being in the personality space however as the PPA is based on behavioural preferences from DISC theory, the HPTi is based on the Big Five model, and behaviour is driven by personality, it is unexpected that this will be seen across all six traits, with some factors relating more strongly to certain HPTI traits than others. An overview of the HPTi factors and predictions for how they are expected to correlate with the PPA are provided below.

- ✓ **Conscientiousness:** *This trait focuses on achievement striving and self-motivation.*
- ✓ **Adjustment:** *This trait measures resilience to stress and how an individual responds to this stress or pressure.*
- ✓ **Curiosity:** *This trait focuses on seeking novelty and openness to new approaches.*
- ✓ **Risk Approach:** *This trait focuses on the willingness and ability to confront and solve difficult situations.*
- ✓ **Ambiguity Acceptance:** *This trait measures approach to uncertainty and complexity.*
- ✓ **Competitiveness:** *This trait focuses on the need to achieve and fulfil positions of power and influence.*

Higher levels of Dominance indicate the desire to achieve results and to have power. It would therefore be expected that Dominance would correlate most strongly with higher levels of the Competitiveness trait. As higher Dominance scores also predict characteristics such as being more direct, assertive, and forceful, it was predicted that Dominance would positively correlate with the Risk Approach trait.

It was not expected that Influence would correlate strongly with the HPTi traits. This prediction was based on the fact the HPTi does not include an independent trait looking at extraversion in comparison with other Big Five models and as seen in study 3.2.1.7, Influence was discovered to correlate most strongly with the Extraversion trait.

Those with Higher levels of steadiness are characterised as being patient, accommodating and supportive, they are likely to value the team goals over their individual goals. It was therefore predicted that Steadiness would be negatively correlated with Competitiveness. Higher Steadiness scores also indicates individuals who are; amiable, good listeners and supportive, therefore it was expected that Steadiness would be negatively correlated with Risk Approach. Those with higher levels of Steadiness strive to avoid insecurity therefore uncertainty could be challenging for them to understand what is expected of them. It was therefore theorised that Steadiness would be negatively correlated with Ambiguity Acceptance.

As those with higher Compliance scores strive to avoid conflict, it was predicted that Compliance would be negatively correlated with Risk Approach.

Results are shown in Table 33.

	Conscientiousness	Adjustment	Curiosity	Risk Approach	Ambiguity Acceptance	Competitiveness
D	.28	.09	.28	.40	.28	.43
I	.03	.21	.11	.13	.14	.11
S	-.30	-.18	-.29	-.41	-.28	-.41
C	-.10	-.14	-.21	-.26	-.24	-.31

Table 33: Correlation Coefficients between the PPA factors and the six HPTi Traits (All correlations were significant at the <.001 level)

Pearson Product Moment Correlation Coefficients revealed findings which were consistent with our predictions. The correlation between Steadiness and Ambiguity Acceptance was of a small size and some additional stronger relationships were discovered. Steadiness showed a medium negative correlation with Conscientiousness (-.30). This could be attributed to the need to work at a steady pace ensuring a patient, controlled and accommodating approach. The Compliance scale was discovered to be significantly negatively correlated with the Competitiveness trait (-.31). This could be explained due to higher levels of Compliance indicating a need to ensure quality and standards are met and a need to be compliant to avoid conflict. This would suggest a preference to get things correct over winning power or influence. Additional significant but small correlations were also discovered as shown in Table 33. The findings from this study support construct validity for the PPA.

Study 3.2.1.12 - PPA with Trait Emotional Intelligence Questionnaire

In December 2020, data was extracted from 23,857 individuals who completed the PPA and Trait Emotional Intelligence Questionnaire (TEIQue) for employee selection and development purposes in the UK. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). The TEIQue is a self-report measure of trait emotional intelligence and consists of 15 facets which are organised into four factors: Well-being, Self-Control, Emotionality and Sociability (Petrides, 2006). The PPA and TEIQue hold roots in the personality factor space however are based on different underlying theories. It would therefore be expected they would show some correlations in specific areas. An overview of each facet and the associated predictions are presented below.

Well-being

- ✓ Happiness: Measure of pleasant emotional states and is primarily directed towards the present rather than the past.

- ✓ Optimism: Measures how forward-looking a person is and if the person views the glass as half-full or half-empty.
- ✓ Self Esteem: Measures a person's overall evaluation of themselves.

Self-control

- ✓ Emotion Regulation: Measures short, medium and long-term control of your own feelings and emotional states.
- ✓ Impulse Control: Measures dysfunctional rather than functional Impulsiveness.
- ✓ Stress Management: Measures how people handle pressure and stress, and how effective they are in doing so.

Emotionality

- ✓ Empathy: Measures the extent to which you see the world from someone else's point of view.
- ✓ Emotion Perception: Measures the ability to identify your own emotions as well as the emotions of others.
- ✓ Emotion Expression: Measures the extent to which people are fluent at communicating their emotions to others.
- ✓ Relationships: Measures your personal relationship with others and how effective you are at starting and maintaining emotional bonds with others.

Sociability

- ✓ Emotion Management: Measures your perceived ability to manage other people's emotional states.
- ✓ Assertiveness: Measures how forthright and frank and individual is.
- ✓ Social Awareness: Measures social skills and the ability to adapt to social situations.

Independent Facets

- ✓ Adaptability: Measures an individual's effectiveness at adapting to new environments and dealing with change.
- ✓ Self-Motivation: Measures the extent to which a person is driven by a need to produce work.

Individuals who score higher on the Dominance scale are described by DISC theory as competitive, assertive and strive to avoid failure. They are also proposed to view their environment as antagonistic and take an active approach in response to this. Based on this, it was predicted that the Dominance scale would be positively correlated with the Self-Esteem facet within the Wellbeing factor and Assertiveness within the Sociability factor. Higher scores on the Dominance scale also indicate a preference for being in positions of power and authority over people, therefore it was predicted that the Dominance scale would be positively correlated with the Emotion Management and Social Awareness facets within the Sociability factor.

Based on the assumptions of DISC theory that those who score high on the Influence scale view their environment as friendly and favourable and are more likely to respond with a positive and active approach, it was predicted that the Influence scale would be positively correlated with the facets within the Wellbeing factor: Happiness, Optimism and Self-Esteem. Higher Influence scores also indicate a preference for working with people through communication, networking, and an influential approach. Based on this, the Influence scale was predicted to be positively correlated with the facets within the Emotionality factor: Empathy, Emotion perception, Emotion Expression and Relationships. Due to the focus on communication and people, it was also expected that the Influence scale would be positively correlated with the facets within the Sociability factor: Emotion Management, Assertiveness and Social Awareness.

Based on higher Steadiness scores indicating the adoption of a supportive, amiable approach and listening to others carefully, it was predicted that the Steadiness scale would be negatively

correlated with the Self-Esteem facet within the Wellbeing factor and the Assertiveness facet within the Sociability factor. DISC theory proposes that higher scores on the Steadiness scale indicates that these individuals view the environment as friendly however prefer to take a passive approach in response. Based on this, it was expected that the Steadiness scale would be negatively correlated with the Emotion Management and Social Awareness facets within the Sociability factor. Higher scores on the Steadiness scale indicates a need for security and stability, and DISC theory proposes that those with higher Steadiness scores strive to avoid insecurity. It was therefore predicted that the Steadiness scale would be negatively correlated with the Adaptability facet.

DISC theory proposes that those who score higher on the Compliance scale, view the environment as antagonistic and prefer to respond in a passive way. Based on this, it was predicted that the Compliance scale would be negatively correlated with the facets within the Well-being factor: Happiness, Optimism and Self-Esteem and the facets within the Sociability factor: Emotion Management, Assertiveness and Social Awareness.

Results are shown in Table 34.

	Well-Being Factor			Self-Control Factor			Emotionality Factor				Sociability Factor			Independent Facets	
	Happiness	Optimism	Self Esteem	Emotion Regulation	Impulse Control	Stress Management	Empathy	Emotion Perception	Emotion Expression	Relationships	Emotion Management	Assertiveness	Social Awareness	Adaptability	Self-Motivation
D	.04***	.09***	.22***	.06***	-.05***	.05***	-.08***	.03***	.05***	-.16***	.32***	.53***	.25***	.13***	.08***
I	.27***	.30***	.27***	-.01	-.11***	.10***	.17***	.21***	.28***	.20***	.21***	.15***	.41***	.16***	.05***
S	-.15***	-.19***	-.33***	-.08***	0.01	-.11***	-.02*	-.13***	-.16***	.04***	-.37***	-.53***	-.40***	-.19***	-.13***
C	-.17***	-.24***	-.25***	.02**	.20***	-.05***	-.03***	-.12***	-.17***	.00	-.30***	-.36***	-.34***	-.13***	-.02***

Table 34: Correlation coefficients between the PPA factors and the 15 TEIQue facets (,**,*** indicates significance level, *<.05, ** <.01, ***<.001).*

Pearson Product Moment Correlation Coefficients revealed significant correlations between many of the TEIQue facets and PPA factors as expected. Some additional relationships were discovered which were not predicted. The Influence scale was discovered to be positively correlated with the Adaptability facet (.16). This could be attributed to the friendly and opportunistic view of the environment, and the adoption of an active approach or response. Based on this, individuals with higher scores on the Influence scale would see change as a positive and would be more likely to embrace it and respond effectively to it. The Steadiness scale was discovered to be negatively correlated with both the Happiness (-.15) and Optimism (-.19) facets within the Well-being factor and the Emotion Expression (-.16) facet within the Emotionality factor. The Compliance scale was discovered to be negatively correlated with the Emotion Perception (-.12) and Emotion Expression (-.17 facets within the Emotionality factor and the Adaptability (-.13) facet. These correlations were all modest and the overall findings support construct validity for the PPA.

Study 3.2.1.13 - PPA with General Intelligence Assessment

To test for discriminant validity, in September 2020 data was extracted from 26,826 individuals who had completed the PPA and the General Intelligence Assessment (GIA) as part of employee selection and development practices. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). The GIA is a standardised measure of fluid intelligence, measuring five distinct areas (verbal reasoning, word meaning, number speed and accuracy, perceptual speed and spatial visualisation) and provides an 'overall rank' score based on where the score sits within the comparative normative group on the five distinct areas (GIA reference). As fluid intelligence and personality are distinct constructs, the GIA was chosen as a suitable measure for determining discriminant validity as the two measures should not correlate with one another. According to Cohen's (1988) conventions,

Pearson Product Moment Correlation Coefficients revealed weak or negligible significant relationships between the PPA factors and the Overall Rank; Dominance r=.07, p<.001, Influence r=−.01, p<.05, Steadiness r=−.06, p<.001, Compliance r=−.02, p<.001. Although statistical significance was discovered, the effect size demonstrates the constructs do not relate in a meaningful way and can be attributed to the large sample size (Cohen, 1990).

3.2.2 Criterion Validity

Study 3.2.2.1 – PPA job fit and work performance

As its primary use case the PPA is intended as a tool to aid in employee selection, allowing test users to create an ideal job profile of PPA behavioural preferences for a role and then comparing this with the PPA profiles of job applicants. This study was specifically designed with this use case in mind. The study aimed to showcase the relationship between how closely participants' PPA profiles matched the ideal PPA profile for their role and their job performance in that role.

In 2020, 546 people participated in a study utilised to showcase the outcomes that the PPA personality profiles claim to predict. Participants were those who volunteered to take part in psychology research and were incentivised through insights into their behavioural preferences.

Ideal PPA profiles for given roles were created from existing ideal job profiles that had been created by Thomas clients. This approach was chosen as they are mostly HR professionals, recruiters and hiring managers who were creating ideal PPA profiles for genuine roles that they were recruiting for, and so when aggregated would be a reliable read of actual job demands. A total of 3,252 unique job profiles were grouped by job families where there was considerable overlap (for example, "salesperson", "account manager", "estate agent" were grouped together as the behavioural demands of these similar jobs are likely very similar). Job families used in the present study had at least 100 unique job profiles. Ideal PPA profiles for each of the job families were calculated by taking the modal of each of the profiles.

After completing the PPA, participants selected from the list of job families which one matched their current role and their most recent previous role. "Other" was an option for where there wasn't a good match. A fit score was calculated based on the inverse of the difference between their scores on each of the four PPA factors and the ideal profile for that job family.

The Individual Work Performance Questionnaire was utilised to measure job performance of both participants' previous jobs and current jobs. This questionnaire was given to participants in order to gauge how well they performed in their previous and current roles in order to determine if there is a relationship between one's job fit score through their PPA profile and their job performance.

Job fit predicted both task performance (a subcomponent of job performance) and contextual performance (another subcomponent of job performance). The correlations involved were 0.25 for previous job fit and task performance and 0.29 for previous job fit mode and contextual performance. The correlations for participants' current job were 0.46 between current job fit and task performance and 0.31 between current job fit and contextual performance. Task performance has traditionally been the main focus of individual work performance (Koopmans et al., 2013) and is the defined as "the proficiency with which individuals perform the core substantive or technical tasks central to his or her job (Campbell, 1990)." This relationship between one's current job fit and one's task performance (r = 0.46) is indicative of a strong predictive correlation.

This study provides strong support for the use of the PPA to aid selection decisions. Participants with a closer behavioural match to the demands of the job performed better at that job.

Study 3.2.2.2 – PPA, Burnout and Resilience

In 2019, in order to understand how well behavioural preferences influenced individuals' resilience and burnout 197 participants took the PPA, a Resilience measure (Brief Resilience Scale, Smith et al., 2008), and a Burnout measure (the work-related burnout scale in the Copenhagen Burnout Inventory, Kristensen et al., 2005). Participants had all previously volunteered to take part in psychology research and were incentivised through insights into their behavioural preferences. Results are shown in Table 35.

	D	I	S	C
Resilience	0.22	0.13	-0.15	-0.27
Burnout	-0.05	-0.19	0.11	0.17

Table 35: Correlation coefficients between the PPA factors, Resilience and Burnout.

Resilience had a small positive correlation with PPA dimensions Dominance (r = 0.22) and Influence (r = 0.13) and had a small negative correlation with PPA dimensions Steadiness (r = -0.15) and Compliance (r = -0.27). This indicates that the higher one's D and/or I dimensions are in their PPA, that the more resilient they are to adversity. Resilience involves individuals being able to maintain control of a situation, understanding and accepting challenges, and come up with new ways to tackle problems that may arise. These individuals also often maintain strong social connections. These correlations is consistent with expectations when looking at the descriptors of D and I dimensions. Those high in Dominance are often considered reckless, are restless, and enjoy competition. Those with high Influence are outgoing and persuasive. They enjoy gathering with groups of people and enjoy public relations and promoting themselves. These are individuals who both put themselves in higher stress situations as well as characterise situations as less stressful than those who are higher in Steadiness or Compliance, for example.

Similar results hold true when looking at the relationship between Burnout and PPA dimensions (albeit to a lesser extent). Burnout had a small negative correlation with Dominance (r = -0.05) and Influence (r = -0.19), while Burnout had a small positive correlation with Steadiness (r = 0.11) and Compliance (r = 0.17). These results indicate that the more Dominance and the more Influence one has in their PPA profile, the less Burnout one will experience. However, the relationship between Dominance and Burnout is a weak negative correlation, which indicates that their relationship with one another is increasingly small. However, the more Steadiness and Compliance one has in their PPA profile, the more Burnout one will experience. One's PPA profile relates to Resilience in a similar way that one's profile relates to Burnout. Burnout stems from chronic workplace stress and involves feelings of energy depletion or exhaustion and negativity and/or cynicism to one's job. This makes sense when looking at the profiles of those with high Steadiness and/or high Compliance. Those with high Steadiness are controlled and enjoy routine. They do not handle situations that are out of their daily routine with as much comfort and ease as someone with lower Steadiness might. Those with high Compliance are non-aggressive and cautious; they aim to gather all facts before making a decision. These individuals strive for a stable and ordered life. Both those high in Steadiness and high in Compliance are more likely to feel Burnout than those high in Dominance and Influence due to these traits; they are more likely to burn out due to their inclination for repetition and their dislike for change and spontaneity in the workplace.

Study 3.2.2.3 – Call Centre, South Africa

In 2017, PPA data was compared with organisational data from a South African call centre in order to establish successful behavioural profiles. Firstly, 1,173 individuals who were hired following a successful application process were compared against 869 individuals who were unsuccessful in order to explore potential differences in behavioural preferences. Secondly, out of the 1,173 employed agents, 876 active employees were compared against 298 leavers. Out of the 876 active employees, function, performance ratings, and behaviour ratings were compared and

explored. As for function, employees either worked in the Sales (203), Tech (355), Customer Service (134), or Loyalty (101) function. Performance and behaviour ratings were measured on a scale of a 1 (lowest rating) to 5 (best rating). The individuals took the PPA in order to assess their behavioural preferences. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2).

The findings show that people with Influence in their profile were more likely to get hired than those without I in their profile. This finding relates to the fact that individuals with Influence in their profile are more likely to sell themselves well at interview through being naturally communicative, positive and persuasive in their approach.

The findings also shows that when breaking the relationship down by function between performance ratings / groups and PPA factors (for all active employees), employees in the Sales function who have a preference for Dominance received higher Performance ratings than those without D in their profile. This is because individuals with Dominance in their profile tend to be more results-oriented, competitive, and well-suited to closing sales. In line with this, Dominance has been found to relate to increased performance levels in sales roles within CCI.

Conversely, employees in the Sales Function with a preference for Steadiness received lower Performance ratings than those without S in their profile. This is because those without Steadiness in their profile are more inclined to drive sales through their fast-paced work ethic.

Another finding within the Sales Function is that employees with a preference for Influence received lower Behavioural ratings than those without I in their profile while employees with a preference for Dominance received higher Behaviour ratings than those without D in their profile. Again, Dominance was found to be a positive attribute in the sales function, this time in terms of behaviour. The drive and desire to get results are likely to be the behaviours that managers are looking for in their sales people. Influence, however, was shown to produce lower behaviour ratings. This may be due to individuals with high levels of influence having a preference for being communicative and friendly, and perhaps less focused on closing the sale.

Conversely, in the Customer Service function, employees with a preference for Dominance received lower Behaviour ratings than those without D in their profile. This is most likely due to the direct and blunt nature those with Dominance communicate to customers. Those with a preference for Steadiness received higher Behaviour ratings in the Customer Service function than those with a preference away from Steadiness. This is due to the controlled, calm and relaxed nature that those with high Steadiness communicate to customers. This finding emphasises the importance of an accommodating, amiable and thorough approach in a customer service role.

Study 3.2.2.4 – Banking call centre, Canada

A Canadian banking company used Thomas' PPA Assessment in order to understand the behaviours needed to thrive within the company and how they explain performance over time in 2018. 303 employees in the call centre were assessed across three slightly different call centre roles. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). The PPA was used to measure behaviour and a myriad of performance metrics important for the organisation, including Performance ranking, Average handling time of calls, Sales per call, Quality monitoring scores, First call resolution rate, Adherence scores, Absenteeism and lateness and total errors. Overall performance scores were created for each individual employee based on the three positions that were assessed.

The overall findings showcase that Higher Dominance was associated with a range of positive outcomes, including performance, Sales per call and Quality monitoring. Having Dominance as a working strength would mean employees are more competitive, driven, inquisitive, and focused on getting results and solutions. This quality specifically applied to Quality Monitoring, one of the

performance metrics used, as this measure represents a key aspect of how employees were rewarded and rated.

Sales per call

Significant differences were found in behavioural preferences and average Sales Per Call. Specifically, employees with Influence as their Leading Factor (r = .11, p < .05), Steadiness as a Supporting Factor (r = -.12, p < .01), and lower Compliance (*either as a supporting factor [*r = -.12, p < .05*], or lower on graph III [*r = -.13, p < .05*]*) had a higher Sales Per Call on average. Whilst having Dominance as a Working Strength was important for higher Sales Per Call, this result only bordered on significance (r = .11, p = .054).

Quality monitoring

Quality monitoring as predicted by Dominance as a working strength. Employees who have Dominance as a working strength are more competitive and driven. As Quality Monitoring represents a key aspect of how employees are rewarded and rated, high Dominance employees are likely to be more focused on 'winning' in this area.

Absenteeism and Lateness

Significant relationships were found between the individual assessment data and how many times an employee was late or was absent due to sickness. For instance, employees with lower Influence (r = .12, p < .05) and higher Dominance (r = -.12, p < .05) had fewer sick days. These results show that having Dominance as a working strength means an employee will be competitive, driven and look to get results. This shows that it is likely these employees will strive to be on time in order to get results. Influence plays a role as a support factor and relates to those who are more serious and unlikely to show up later due to a higher awareness of their actions.

Study 3.2.2.5 – PPA and Sales Performance

In 2015, 182 employees at one furniture manufacturing company in the UK participated in a benchmark to identify characteristics of successful employees to improve sales performance, review the recruitment policy, and target areas of training. Employees took the PPA to measure behavioural preferences. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). Performance measures were averaged for the last five quarters and included sales conversion, average sales value, and lost sales.

Having a low Dominance, being accommodating and non-demanding, was found to be better for performance. Specifically, employees with lowest Dominance has significantly fewer lost sales (mean = 41) than employees higher on Dominance (mean = 48, p<.05). Additionally, it was found that out of all employees who received a complaint, 41.7% had Dominance while 17.6% did not (p<.05).

Analyses found that employees with high Steadiness had significantly lower conversion rates than employees without Steadiness (mean = 51.25%, mean = 56.61% respectively, p<.05). The organisation had expanded greatly and quickly during this time meaning employees have had to go through numerous fast-paced changes. This may have affected sales performance for those high on Steadiness, who tend to like stability and consistency. Conversely, employees with no Steadiness tend to be alert and flexible in times of change, enabling them to perform well during the expansion.

Study 3.2.2.6 – PPA and Leadership

In 2017, 179 employees in one organisation participated in this benchmark in which employees were compared to their manager ratings on key competencies to identify the key attributes of a successful leader. Behavioural preferences were assessed with the PPA. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale

correlations (see Section 2.5.3.2). Leadership success was measured using a custom rating survey created for the team. Managers rated the effectiveness of their direct report on 5 focus areas identified by the network as the core competencies of a role model, including understands the big picture, challenges the status quo, cultivates broader relationships, develops their people and makes and own decisions.

A significant difference was found in Dominance scores between overall survey performance groups. Specifically, top Overall performers had higher Dominance scores than bottom performers. This relationship was also found when looking at Dominance as a working strength. The odds of being a top Overall performer is 2.78 times greater for employees with Dominance in their profile than for those with a preference away from Dominance. These findings suggest that the characteristics associated with a preference for Dominance, such as being assertive, driving and self-starters, will be beneficial for role models at the network, especially when considering the need to challenge the status quo and focus on the big picture to drive change.

Understands the big picture

A significant difference was found in Dominance scores between 'Understands Big Picture' performance groups. Specifically, top BP performers had higher Dominance scores (0.5 ± 5.9) than bottom performers. This relationship was also found to be marginally significant when looking at Dominance as a working strength. The odds of being a top BP performer is 2.44 times greater for employees with Dominance in their profile than for those with a preference away from Dominance. People with Dominance in their profile tend to focus on the big picture and drive for results while people with a preference away from Dominance prefer to focus on the detail. This factor will be advantageous for having a strategic view and applying key business metrics to impact the big picture.

Challenges the Status Quo

A significant difference was found in Dominance scores between 'Challenges the Status Quo' performance groups ($t(102.9) = -3.31$, $p < .01$, $d = -0.62$). Specifically, top SQ performers had higher Dominance scores (0.3 ± 5.9) than bottom performers (-2.9 ± 4.2). Conversely, the significant difference found in Steadiness scores and SQ performance groups ($W = 1968$, $p < .05$, $r = -0.22$) showed that top SQ performers had lower Steadiness scores (-1.3 ± 4.9) than bottom performers (0.1 ± 3.8). These relationships were also found when looking at Dominance and Steadiness as working strengths. The odds of being a top SQ performer is 2.3 times greater for employees with Dominance in their profile than for those with a preference away from Dominance. The odds of being a top SQ performer is 2.83 times greater for employees with low Steadiness than for those with Steadiness in their profile. People with high Dominance tend to be assertive and challenge the status quo, while those with High Steadiness tend to be accommodating and prefer harmony than challenging others. Having Dominance and Low Steadiness will be advantageous for a network role models to challenge the status quo and pioneer change.

Cultivates Broader Relationships

A significant relationship was found between Compliance scores and 'Cultivates Broader Relationships' scores ($W = 2205.5$, $p < .01$, $r = -0.27$). Specifically, top CR performers had lower Compliance scores (-1.6 ± 3.2) than bottom performers (0.3 ± 3.2). This relationship was also found when looking at Compliance as a working strength. The odds of being a top CR performer is 3.27 times greater for employees with Low Compliance than for those with Compliance in their profile. Employees with Low Compliance tend to be more independent and adventurous compared to those with High Compliance who tend to be more focused on policy and technical accuracy. People without Compliance in their profile will likely be more comfortable building relationships in and out of their organisation and influencing key stakeholders than employees with Compliance in their profile prefer to focus on processes than people.

Develops their people

A significant relationship was found between Dominance scores and the focus area 'Develops their People' (W = 737.5, p < .05, r = -0.25). Specifically, top DP performers had higher Dominance scores (0.6 ± 5.9) than bottom performers (-2.3 ± 4.6). This relationship was also found when looking at Dominance as a working strength. The odds of being a top DP performer is 3.21 times greater for employees with Dominance in their profile than for those with a preference away from Dominance. Employees with High Dominance can be good at directing others and delegating work without micro-managing. Their need to drive for results can be useful for developing others and leading for others to follow.

Makes and owns decisions

A significant relationship was found between Compliance scores and 'Makes and Owns Decisions' scores (W = 1846.5, p < .01, r = -0.28). Specifically, top MD performers had lower Compliance scores (-1.8 ± 3.1) than bottom performers (0.1 ± 3.2). This relationship was also found when looking at Compliance as a working strength. The odds of being a top MD performer is 3.06 times greater for employees without Compliance in their profile than for those with a preference for Compliance. People with a preference for Compliance prefer to thoroughly analyse a situation and weigh the pros and cons before making a decision. Their careful approach can make them indecisive when under pressure or with limited or ambiguous information. Employees with Low Compliance, on the other hand, will likely feel more comfortable performing under pressure, managing ambiguous or complex information and making timely decisions.

Study 3.2.2.7 – PPA and Management

In 2017, the PPA was used to assess behavioural preferences of 88 Assistant Managers at a vehicle manufacturer. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). The PPA was compared to employee performance and promotion readiness. Performance was measured using an average results score and an average process score. Promotion readiness was measured using survey scores completed by the management team who rated Assistant Managers on various skills and readiness for promotion.

A significant negative relationship was found between Results scores and Steadiness after controlling for the effect of tenure (r = -0.55). AMs with Steadiness in their profile had significantly lower Results scores than AMs with a preference away from Steadiness. These results suggest that AMs who tend to be more active, demonstrative, variety-seeking (low Steadiness characteristics) may be more successful at driving for results than those who tend to be more dependable, thorough and accommodating (high S characteristics).

A significant relationship was found between Dominance scores and being selected for one of the top 3 Assistant Managers in technical skills (r = 0.34). Specifically, AMs who were selected at least once for Technical Skills Top 3 had higher Dominance scores than those who were never selected. These characteristics are advantageous for being rated with high levels of technical skills due to these individuals being self-starters, driving, and inquisitive.

This benchmark supports the implications of those with high Dominance and those with low Steadiness for these Assistant Managerial roles. The findings suggest that individuals who drive for results and display Confidence (through high Dominance) as well as who can work at a fast and active pace (through low Steadiness) are viewed as having higher levels of potential in their Assistant Manager positions.

Study 3.2.2.8 – Transport company, UK

In 2015, Thomas gathered data from 73 employees from 12 different teams in order to identify behavioural characteristics of successful revenue protection inspectors. This data was gathered in order to improve performance and review the recruitment policy. The PPA was used to measure

behavioural preferences. Employee performance measures were averaged for the last 13 periods. The primary measure of sales performance used for analyses was rank score which was a composite of various direct performance metrics. The average rank score for this sample is 68.45 (ranging from 10.78 to 195.26).

Having a preference for Dominance was found to be significantly related to better performance at this company. Specifically, staff with Dominance in their profile had significantly better Rank Scores (mean = 94.6) than employees with no Dominance in their profile (mean = 64.5, $p<.01$). Employees leading with Dominance tend to drive for results despite opposition or challenge. This is useful for problem solving and decision-making competencies. staff need to be able to make rapid and rational decisions by gauging short and long term consequences. Dominance-led employees tend to be driven and are able to make effective decisions. They also have a more direct communication style, which means they may be better able to communicate to customers with impact. Employees need to provide clear and straightforward communication and in order to set out their position clearly and convincingly, even when faced with difficult or demanding situations.

Analysis also found that not having a preference for Steadiness was associated with better RPI performance. Specifically, it was found that employees with Steadiness in their profile had significantly lower Rank Scores (mean = 64.7) than employees without Steadiness (mean = 85, $p<.05$). This would suggest that employees with a preference away from Steadiness, who tend to be more active, alert, and flexible may perform better in this role.

Study 3.2.2.9 – PPA and Job Role Characteristics

T tests were used to test for differences between specific job roles and all other roles in the prevalence of each PPA factor. Data was extracted from 61,076 who had completed the PPA for selection and development purposes between 2012 and 2020 and who had also provided their job role. It would be expected that certain job roles would see higher or lower levels of each factor compared to the rest of the population, dependent on the demands and required characteristics of that job role.

The full list of job roles was as follows, with those selected for the study highlighted:

- ✓ Accountancy and Actuarial Professionals
- ✓ Administrative & Secretarial Work
- ✓ Architects Property Management and Surveyors
- ✓ Buying and Purchasing
- ✓ Counselling, Social or Guidance Services
- ✓ Customer Service Occupations
- ✓ Engineering Science or Technology Professionals
- ✓ Finance Professionals
- ✓ General Management/Corporate Management
- ✓ Health Care Professionals
- ✓ Hospitality and Events Management
- ✓ Human Resources and Employment
- ✓ Legal Professionals
- ✓ Leisure Sport and Tourism
- ✓ Logistics and Transport
- ✓ Management Consultants
- ✓ Marketing Advertising and PR
- ✓ Military Fire and Police Services
- ✓ Process Plant and Machine Operatives
- ✓ Project Management
- ✓ Public Service Professionals
- ✓ Publishing Media and Performing Arts

- ✓ Research
- ✓ Sales
- ✓ Skilled Trades
- ✓ Teaching and Teaching Support

Below are the predictions related to each selected job role:

- ✓ Accountants & Actuarial Professionals: As accuracy and attention to detail are both behavioural demands of Accountants and Actuarial professionals, it would be expected to see higher levels of the Compliance factor compared to the general population. These individuals are also required to work with facts and figures, probing information, it is therefore also expected to see these job roles to be negatively correlated with the Influence scale.
- ✓ Administrative & Secretarial Work: Administrative and secretarial work requires thoroughness, organisation and a systematic way of working. Based on the behavioural demands of these types of roles it would be expected to see lower Dominance scores and higher Steadiness and Compliance scores in comparison to the general population.
- ✓ Counselling, Social or Guidance Services: The behavioural requirements of those in counselling, social or guidance services are to be patient, kind and good at listening. It would therefore be expected to see lower levels of Dominance and higher levels of Steadiness in these professionals.
- ✓ Engineering, Science & Technology Professionals: These professionals are required to work in a process orientated, systematic, precise and logical way ensuring facts and figures are accurate. Based on these behavioural requirements, it is expected they will show higher Compliance scores and lower Influence scores than the general population.
- ✓ Health Care Professionals: Healthcare professionals are typically required to be patient, thorough, methodical, and accurate following process and procedure in the work setting. It would therefore be expected to see health care professionals with lower Dominance scores and higher Steadiness and Compliance scores in comparison with the general population.
- ✓ Sales Professionals: The behavioural requirements of a sales professional are to strive towards hitting targets and closing sales, whilst communicating effectively with customers to influence them into buying. Based on the behavioural demands of a sales role, it would be expected to see higher levels of Dominance and Influence, and lower levels of Steadiness and Compliance in Sales professionals.

Results are shown in Table 36.

	Dominance			Influence			Steadiness			Compliance		
	d	*t*	*p*	*d*	*t*	*p*	*d*	*t*	*p*	*d*	*t*	*p*
Accountants & Actuarial Professionals	−.26	−14.14	<.001	−.22	−11.95	<.001	.26	13.73	<.001	.32	17.06	<.001
Administrative & Secretarial Work	−.60	−34.70	<.001	−.10	−5.75	<.001	.60	34.19	<.001	.33	19.25	<.001
Counselling, Social or Guidance Services	−.19	−2.94	<.001	−.04	−0.65	>.05	.31	4.65	<.001	−.02	−0.29	>.05
Engineering, Science & Technology Professionals	.00	0.15	>.05	−.36	−23.14	<.001	.11	7.19	<.001	.28	18.76	<.001
Health Care Professionals	−.22	−7.70	<.001	−.06	−2.30	<.05	.25	8.80	<.001	.13	4.52	<.001

Sales Professionals	.37	32.69	<.001	.44	39.319	<.001	-.47	-41.72	<.001	-.51	-44.84	<.001

Table 36: Effect sizes, t and significance values for each job role analysed and PPA factor.

Findings for each group of professions are discussed below:

- ✓ Accountants & Actuarial Professionals – As predicted, those in Accountant & Actuarial Professions were found to score lower on the Influence scale and higher on the Compliance scale. These roles were also discovered to be negatively associated with the Dominance scale, indicating a more considered, hesitant approach and positively associated with the Steadiness scale, indicating a patient, thorough and methodical approach. The strongest correlation was the positive correlation with the Compliance scale.
- ✓ Administrative & Secretarial Work – As expected, it was discovered that Administrative and Secretarial work was strongly negatively correlated with the Dominance scale and strongly positively correlated with the Steadiness scale. A moderate positive correlation with the Compliance scale was also discovered as predicted.
- ✓ Counselling, Social or Guidance Services – In line with our predictions, Counselling, Social and Guidance Services were discovered to be significantly negatively correlated with the Dominance scale and positively correlated with the Steadiness scale.
- ✓ Engineering, Science & Technology Professionals - As predicted, Engineering, Science and Technology professions were revealed to be significantly negatively correlated with the Influence scale and positively correlated with the Compliance scale. We also discovered a small significant positive correlation between these professions and the Steadiness scale beyond our predictions.
- ✓ Health Care Professionals: As predicted, Health Care professions were significantly negatively correlated with the Dominance scale and significantly positively correlated with both the Steadiness and Compliance scales.
- ✓ Sales Professionals – As expected, Sales professions were found to be significantly positively correlated with both the Dominance and Influence scales, and significantly negatively correlated with both the Steadiness and Compliance scales.

Study 3.2.2.10 – PPA and Job Level

T tests were used to test for differences in job level and PPA factors. Data was extracted from 61,076 individuals who had completed the PPA for selection and development purposes between 2021 and 2020 and who had provided their job level. The equivalence of the old and new PPA forms have been shown as per EFPA guidelines through median scale correlations (see Section 2.5.3.2). It was expected to see a difference in Dominance levels between those in non-management roles (Lower Dominance Scores) compared to those who were in management level roles (Higher Dominance Scores). The rationale for this being that those with higher Dominance scores are more likely to be assertive, direct and results driven which are qualities likely to be required of managers. Results are shown in Table 37.

	Dominance			**Influence**			**Steadiness**			**Compliance**		
	d	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***	***d***	***t***	***p***
Job Level (Non-management vs Management)	-.34	-40.67	<.005	-.06	-7.66	<.005	.34	40.43	<.005	.17	20.39	<.005

Table 37: Effect size, t and significance values for each PPA factor.

The analysis revealed small effect sizes for job level with Dominance and as expected, those in non-management roles showed lower levels of Dominance compared to those in Management

roles. Those in non-management roles were also discovered to score Higher on the Steadiness scale compared to those in management roles.

3.2.3 Validity Summary

The research outlined above demonstrates the validity of the PPA. Firstly, as a construct the PPA model has been shown to have good fit across multiple fit indices and item scores correlate well with overall factor scores. Furthermore, the PPA has been shown to be fair, demonstrating no ethnicity, age or education differences and only modest gender differences on some factors when taken at a whole working population level which are not replicated when narrowing the focus to a single organisational sample. This suggests differences are reflecting differing behavioural demands of roles that are more frequently taken up by women or men. Further to the topic of fairness, the PPA items have also been shown to only include one adjective on one item that exhibits differential item functioning and so the effect of this on overall assessment scores would be negligible.

The research above aims to position the PPA behavioural preferences model amongst other contemporary models of behavioural, motivation and personality. The interpersonal circumplex as a model of interpersonal behaviour and the aspects of socioanalytic theory as a model of motivation for behaviour show clear theoretical similarities to the PPA model of preferred or habitual behaviours whilst still aiming to explain behaviour from different standpoints. Strong correlations between scores on the PPA, IPC and SAT measures demonstrated above highlight theoretical similarities and support the PPA construct.

The PPA is not a measure of personality, but by demonstrating links between prominent personality models and the PPA we can better understand the link of how underlying personality drives styles of behaviour. The support of theorised links between the PPA and the Big Five personality model, Cattell 16 Personality Factors Scale, the Occupational Personality Questionnaire, Eysenck Personality Questionnaire, the Dark Triad, The High Potential Trait Indicator and the Trait Emotional Intelligence Questionnaire show how personality drives behaviour as well as providing strong validation of the PPA construct.

The research above also provides very strong criterion validation support for the PPA. The PPA's primary use is to aid employee selection decisions and so the job fit and work performance study above is very important in demonstrating how matching job applicants' behavioural preferences to job demands results in better work performance. These correlations were very strong for a criterion measure. Further research showing the link between the PPA and resilience and burnout as well as performance in a range of roles from call centres, sales, leaders, managers and revenue protection inspectors highlights the utility of the PPA to inform employee selection decision making.

Overall, the PPA model is a well-supported construct and one with very apparent criterion validity.

4.0 References

Allport, G. W. (1961). *Pattern and growth in personality.* Holt, Reinhart & Winston.

Berkshire, J. R., & Highland, R. W. (1953). Forced-choice performance rating—a methodological study. *Personnel Psychology*, *6*(3), 355-378.

Bernreuter, R. G. (1933). The theory and construction of the personality inventory. *The Journal of Social Psychology*, *4*(4), 387-405.

Borgatta, E. F., Cottrell Jr, L. S., & Mann, J. H. (1958). The spectrum of individual interaction characteristics: An inter-dimensional analysis. *Psychological Reports*, *4*(3), 279-319.

Bronfenbrenner, U., Harding, J., & Gallwey, M. (1958). The measurement of skill in social perception. *Talent and society*, 29-111.

Bruner, J. S., Shapiro, D., & Tagiuri, R. (1958). The meaning of traits in isolation and in combination. *Person perception and interpersonal behavior*, 277-288.

Carter, L. F. (1954). Evaluating the performance of individuals as members of small groups. *Personnel Psychology, 7,* 477–484.

Cattell, R. B. (1949). *Manual for Forms A and B: 16PF Questionnaire*. Champaign Ill. IPAT.

Chauncey, H., & Frederiksen, N. (1951). *The functions of measurement in educational placement.* In E. F. Lindquist (Ed.), *Educational measurement* (p. 85–116). American Council on Education.

Childs, B. R., Weidman, J. E., Farnsworth, C. B., & Christofferson, J. P. (2017). Use of personality profile assessments in the US commercial construction industry. International Journal of Construction Education and Research, 13(4), 267-283.

Cohen, J. (1988.) Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, J. (1990). Things I have learned (so far) Am Psychol. 45, 1304–1312.

Couch, A., & Keniston, K. (1960). Yeasayers and naysayers: Agreeing response set as a personality variable. *The Journal of Abnormal and Social Psychology*, *60*(2), 151.

Cronbach, L. J. (1955). Processes affecting scores on" understanding of others" and" assumed similarity.". *Psychological bulletin*, *52*(3), 177.

Cronbach, L. J. (1960). *Essentials of psychological testing*. New York Harper & Row.

Cuevas, M., & Cervantes, V. H. (2012). Differential item functioning detection with logistic regression. *Mathématiques et sciences humaines. Mathematics and social sciences*, (199), 45-59.

Diekmann, J., & König, C. J. (2015). Personality testing in personnel selection: Love it? Leave it? Understand it!. In Employee Recruitment, Selection, and Assessment (pp. 129-147). Psychology Press.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The Mini-IPIP scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment*, *18*, 192-203.

Edwards, A. L. (1957). *The social desirability variable in personality assessment and research.* Dryden Press.

Evers, A., Hagemeister, C., Høstmælingen, A., Lindley, P., Muñiz, J., & Sjöberg, A. (2013). EFPA review model for the description and evaluation of psychological and educational tests. Test review form and notes for reviewers. Version 4.2, 6.

Eysenck, H. J. (1975). Manual of the Eysenck personality questionnaire. 1975. *Educational and Industrial Testing Service: San Diego*.

Flanagan, J. C. (1935). *Factor analysis in the study of personality.* Stanford Univ. Press.

Furlow, L. (2000). Job profiling: building a winning team using behavioral assessments. JONA: The Journal of Nursing Administration, 30(3), 107–111.

Gurtman, M. B. (2009). Exploring personality with the interpersonal circumplex. *Social and personality psychology compass*, *3*(4), 601–619.

Jackson, D. N., & Messick, S. (1958). Content and style in personality assessment. *Psychological Bulletin*, *55*(4), 243.

Jodoin, M. G., & Gierl, M. J. (2001). Evaluating type I error and power rates using an effect size measure with the logistic regression procedure for DIF detection. *Applied Measurement in Education*, 14(4), 329-349.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the short dark triad (SD3) a brief measure of dark personality traits. *Assessment*, *21*(1), 28–41.

Kasselmann, B. von. H., De Beer, Johannes J. & Vermeulen, L. P. (2002). Personality attributes of successful franchisees in the fast foods sector in South Africa. *South African Journal of Economic and Management Sciences*, *5*(1), 154–179.

Kelly, E. L., & Fiske, D. W. (1951). *The prediction of performance in clinical psychology.* The University of Michigan Press.

Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, *19*(3), 192–207.

Leary, T. (1957). *Interpersonal Diagnosis of Personality*. New York: Ronald Press

Lecky, P. (1945). *Self-consistency; a theory of personality.* Island Press.

Lykourentzou, I., Antoniou, A., & Naudet, Y. (2015). Matching or crashing? personality-based team formation in crowdsourcing environments. arXiv preprint arXiv:1501.06313.

MacRae, I., & Furnham, A. (2014). High potential: How to spot, manage and develop talented people at work. Bloomsbury Publishing.

Mahan Jr, T. W., & Wicas, E. A. (1964). Counselor personality characteristics: a preliminary exploration. *Counselor Education and Supervision*, *3*(2), 78–83.

Marston, W. M. (1928). Emotions of normal people. *London: Kegan Paul, Trench, Trubner & Co. Ltd*.

Marston, W. M., King, C. D., & Marston, E. H. (1931). *Integrative psychology: A study of unit response*. Routledge.

McCrae, R. R., & Costa, P. T. (1989). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of personality and social psychology*, *56*(4), 586.

Mellor, M. J., Hyer, K., & Howe, J. L. (2002). The geriatric interdisciplinary team approach: Challenges and opportunities in educating trainees together from a variety of disciplines. Educational Gerontology, 28(10), 867–880.

Newman, S. H., Howell, M. A., & Harris, F. J. (1957). Forced choice and other methods for evaluating professional health personnel. *Psychological Monographs: General and Applied*, *71*(10), 1.

Roe, A. (1956). *Wiley publications in the mental health sciences. The psychology of occupations.* John Wiley & Sons Inc.

Rogers, C. R. (1951). Studies in client-centered psychotherapy III: the case of Mrs. Oak—a research analysis. *Psychological Service Center Journal, 3*(1-2), 47–165.

Sarbin, T. R. (1954). Role Theory. In G. Lindzey (Ed.) *Handbook of Social Psychology* (pp 223-258). Hoboken: John Wiley & Sons.

Saucier, G., & Goldberg, L. R. (1998). What is beyond the Big Five?. *Journal of personality*, *66*, 495-524.

Saville, P., & Willson, E. (1991). The reliability and validity of normative and ipsative approaches in the measurement of personality. *Journal of Occupational Psychology, 64*(3), 219–238.

Saville, P., Holdsworth, R., Nyfield, G., Cramp, L., & Mabey, W. (1984). Occupational personality questionnaire manual. *Esher, Surrey: Saville & Holdsworth*.

Scarbecz, M. (2007). Using the DISC system to motivate dental patients. The Journal of the American Dental Association, 138(3), 381-385.

Slowikowski, M. K. (2005). Using the DISC behavioral instrument to guide leadership and communication. AORN journal, 82(5), 835-843.

Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P. and Bernard, J. (2008). The Brief Resilience Scale: Assessing the Ability to Bounce Back. *International Journal of Behavioral Medicine,15*, 194-200.

Sullivan, H. S. (1953). The Interpersonal Theory of Psychiatry. *New York: WW Norton & Company*.

Super, D. E. (1957). *The psychology of careers; an introduction to vocational development.* Harper & Bros..

Tenopyr, M. L. (1988). Artifactual reliability of forced-choice scales. *Journal of Applied Psychology, 73*(4), 749–751.

Ulrich, L., & Trumbo, D. (1965). The selection interview since 1949. *Psychological bulletin*, *63*(2), 100.

Wylie, R. C. (1961). The self concept. Lincoln: Univer.

Zavala, A. (1965). Development of the forced-choice rating scale technique. *Psychological Bulletin*, *63*(2), 117.

Zumbo, B. D. (1999). *A handbook on the theory and methods of differential item functioning (DIF)*. Ottawa: National Defense Headquarters.