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ProfileXT®
Technical Manual

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Technical Manual

Tenth Edition

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About ProfileXT®

A comprehensive solution for predicting job fit, ProfileXT® incorporates Cognitive Abilities, Behavioral Traits, and Interests measures to determine the likelihood that someone will be successful at work.

ProfileXT is based the Total Person Model of job fit, pioneered by foundational studies in workforce performance.

Recent Updates to the Technical Manual

- Updated norm group characteristics drawn from a recent sample of respondents
- Demographic categories reflecting current gender and age definitions for Department of Labor compliance
- Descriptive statistics for scores and reliability coefficient results for all scales confirming statistical power
- Scale-specific statistics such as inter-correlations and distortion scores validating scale measures for predicting job fit

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Chapter 1: Introduction

The ProfileXT® (PXT) Manual is a technical user's guide that highlights the PXT's theory, development, and psychometric characteristics. Proper use of the ProfileXT provides a method for achieving a good fit between person and job. The guide describes ways in which the PXT results can be used to develop effective work teams, succession plans, training programs, and to improve supervision.

The 10th edition of the technical manual includes recent studies on concurrent validity, equity, and an expanded discussion of the job matching process.

The use of the PXT as a human resources assessment spans more than twenty years. During this time, PXT administrations to job applicants and incumbents exceed more than 3.3 million. A multi-dimensional assessment program, the PXT evaluates a person's behavioral traits, interests, and cognitive abilities (thinking style). These three areas of assessment are used to identify characteristics that can lead to a better fit between person and job.

Results from the three assessment domains determine the job match. The job match process compares the characteristics of the individual with individuals who have demonstrated job success. Although some overlap exists, the three assessed domains contribute to a richer understanding of the individual.

The ProfileXT® relies on the results of nine behavioral scales, six interest scales, and four cognitive ability scales to study the potential match between an applicant and a job. The analysis produces information that guides the decision-maker to consider information about the applicant and how well he or she fits to the job.

The results are displayed as STEN scores for each scale in the Thinking Style and Behavioral Traits sections and the percentage of match to the specific job under consideration. The Interests section of the report shows the individual's top three of the six interest scales. A computer-generated, confidential report is produced for the client. An Individual Profile that describes the respondent's results without reference to the client's proprietary Performance Model or specific scale scores may be made available to him or her.

The PXT reports are written in accessible English. Reader-friendly reports mean there is no need for certified or licensed personnel to interpret scores before they may be used. An individual's scores on the specific scales are used to generate statements that describe the person and give the client some insight into how he or she will likely behave on the job. The percent match results that occur when individual scale scores are compared to a benchmark model developed for the client are automatically calculated and require no extrapolation. The greater the congruence between the individual's characteristics and those required to be successful, the higher the percent match. This allows the user to easily understand the individual's match to the job.

Administration

The PXT is untimed and administered through a secure link to the Profiles Assessment Center (PAC). A paper and pencil administration of the PXT is available, with the PXT answers entered into the computer after the assessment is completed. Items are presented in three sections using the response formats listed in Table 1.1. Brief scale definitions are provided here. For expanded scale descriptions, see Appendix A.

Table 1.1

PXT Sections and Item Characteristics

Section	Item Format
Behavioral Traits	**Agree/Disagree Format**
Decisiveness	Confidence one has in accepting risk associated with making timely decisions using what information is available. (Makes timely decisions with confidence and often with imperfect information)
Energy	Tendency toward restlessness, activity, and drive. (Tends to be restless and driven)
Assertiveness	Generalized influence often associated with expressing confidence. (Tends to take charge of people and situations)
Sociability	Social presence relating to one's desire for group associations. (Engages others with ease and enjoys group settings)
Manageability	How one reacts to the limits placed by authority and the acceptance of established procedures
Attitude	The degree to which one is willing to demonstrate trust toward others.

Accommodating	The degree to which one is willing to consider the needs of all group members.
Independence	The manner in which one prefers to be directed and one's potential to accomplish tasks with minimal supervision.
Objective Judgment	The willingness one has to use either reason and logic or intuition.
Interests	**Paired Comparison Format**
Enterprising	Interest in activities in which one uses persuasiveness and enjoys leading others.
Financial/Administrative	Interest in activities that involve the organization or coordination of information.
People Service	Interest in activities that involve helping people and tending to the welfare of others.
Technical	Interest in activities that center on scientific and technical activities, research, and intellectual skills.
Mechanical	Interest in activities that involve applied vocations with tools and machinery, trades, and outdoor activities.
Creative	Interest in activities where one may be imaginative, original, and aesthetic.
Cognitive	**Multiple Choice Format**
Verbal Skill	Vocabulary proficiency.
Verbal Reasoning	Degree of fluency in the use of words as a basis in reasoning and problem solving.
Numerical Ability	Numeric calculation proficiency.
Numeric Reasoning	Ability to use numbers as a basis in reasoning and analysis.
Learning Index	Composite of scores for Verbal Skill, Verbal Reasoning, Numerical Ability, and Numeric Reasoning.

Content Validity

To establish the content validity of the PXT scales, a panel of experts reviewed the domain of items considered to measure the constructs. A survey of the literature highlighted the following steps: determine who would review the instrument, prepare the reviewers for the content validity study, set up the content validity survey, and analyze the measures to determine if the survey instrument is valid (Davis, 1992; Grant & Davis, 1997; Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003).

The panel of experts included three psychologists and two educational measurement experts. All individuals held doctorates in their respective fields and had extensive experience in assessment psychometrics and industrial and organizational psychology. Each expert was briefed on the purpose of the assessment, the use of the instrument, and on the scale definitions.

The experts were given a list of items for each scale and instructed to rate them for representativeness of construct, gender and cultural fairness, and clarity on a 1 to 4 Likert-type scale. Inter-rater Agreement (IRA) was calculated for each item by totaling the number of ratings of 3 or 4 and dividing by the number of raters.

The four-point scale was converted to a dichotomous variable; 1 and 2 ratings = 1, and 3 and 4 ratings = 2. The items the experts picked as 1 (1 and 2) or 2 (3 and 4) were counted. The number of items considered to be 100% representative was divided by the total number of

items. The IRA was calculated for each of the items and for the entire survey.

The *Content Validity Index* (CVI) was calculated to determine the extent to which each item and the survey were valid. The CVI was calculated by counting the number of participants who rated the item as a 3 or 4 and then divided by the number of participants. By averaging all of the CVI's for each item on the survey, the overall CVI for the survey was determined.

The *Factorial Validity Index* (FVI) was used to indicate the degree to which the experts associated items with their respective PXT scales (Rubio et. al., 2003). This measure was determined by using the number of participants who correctly associated the item with the factor divided by the total number of participants. The average across all items was computed to determine the FVI for the three domains. Table 1.2 provides a summary of the content validity analysis for the PXT.

Table 1.2

PXT Content Validity Summary

PXT Domain	Number of Items	Inter-rater Agreement	Content Validity Index	Factorial Validity Index
Behavior	182	.785	.798	.776
Interest*	110	.844	.821	.833
Cognitive	77	.912	.924	.920
Overall	369	.847	.848	.843

* Presented in 55 paired comparisons

The Inter-rater Agreement and Validity Index results shown in Table 1.2 indicate good content validity of the items selected to measure the PXT domains. This method establishes that the content domains are appropriate measures of the constructs. Chapter 3 contains more information about the PXT's construct and criterion-related validity research.

ProfileXT® Reports in Use

The results from the PXT generate 13 different reports. The two most commonly used reports are the Performance Model Comparison report and the associated Interview Guides.

To help the reader understand how the PXT reports are used, some sample statements from them are provided below. In this example, the individual's STEN score on the Assertiveness scale is 8. That score is above the 5 to 7 STEN range in the Performance Model developed by the client for the job in question.

For an applicant, the interview questions help to focus the interview on critical areas to provide information for the placement decision. And, with an incumbent, Performance Model comments assist the supervisor to direct the employee toward behaviors that are aligned to the job.

Assertiveness

Tendency to take charge of people and situations. Leads more than follows.

Example Performance Model Interview Guide statements for an applicant for the position:

- Give an example of a situation when you were successful at building teamwork and improving morale even though you were confronted with a negative attitude from others.
- Tell me about a situation when you successfully challenged someone's ideas. What does this say about your ability to be assertive?
- Describe a situation when you communicated something unpleasant or difficult to your manager. How did you assert yourself?

Example Performance Model coaching comments for employees already in the position:

- Mr. Jones tends to take charge in a group. Encourage his participation as a peer within the group and foster the ability to be patient with the opinions of others. Training in active listening may enhance his ability to cooperate with his team.
- Bob tends to insist on leading others. This needs to be tempered with a willingness to allow others a certain amount of control. Training that focuses on control issues may reveal a way to do this. Offer him the opportunity to lead the group as a reward for successful participation in such training.
- He prefers to influence the decisions of others. Act as a role model in your capacity as a group leader,

demonstrating an authoritative yet democratic leadership style. Provide feedback concerning the effectiveness of your style and why it works with this team.

Summary

This chapter provided an overview of the ProfileXT®. In subsequent chapters, the focus will be on the scale descriptions, job matching process, the psychometric qualities of the assessment program, and its usefulness across job families and legally protected groups. As a human resources tool, the PXT provides a basis for answering people-related questions. The following chapters provide technical information and practical examples to help make those decisions easier and more informed.

Chapter 2: Conceptual Framework

The concept of seeking a match between a person's characteristics and a particular job is not new. Since the first time a person was sought to assist another with a task, the traits that person possessed were assessed in the context of the job to be done. Over time, certain types of people began to be recruited for certain types of jobs. As jobs became more specific, so too did the list of characteristics that needed to be assessed. Initially, and until the relatively recent advent of this type of study, skills and abilities were all that mattered. The only question that needed to be answered was, "Can this person do the job?" We now know that the ability to do a job is only one aspect of ensuring good person-job fit.

The PXT helps to determine the congruence between a person and a job so employers may capitalize on the person-job relationship. Empirical evidence supports this proposition. Research studies show that individuals prefer jobs that are compatible with their personalities and abilities (Bretz, Ash, & Dreher, 1989; Burke & Deszca, 1982; Cable & Judge, 1994; Judge & Bretz, 1992; Turban & Keon, 1993). Employees who enjoy a good job fit report high job satisfaction and performance, and are less likely to separate prematurely from the position (Bretz & Judge, 1993; Chatman, 1989, 1991; Meglino, Ravlin, & Adkins, 1989). In a study of various occupational groups, Caldwell and O'Reilly (1990) found that overall person-job fit is strongly related to a number of outcomes, including job performance and satisfaction.

A survey of occupational assessment research emphasizes an approach that uses multiple measures. One multidimensional approach assesses the work-related qualities of a person on three levels: personality, interest, and ability. The works of Ackerman and Heggestad (1997) and Ackerman and Beier (2003) provide evidence of a strong relationship among personality, interest, and ability.

The conceptual framework of the PXT draws primarily upon the research of Ackerman and Heggestad (1997), Ackerman and Beier (2003), Parsons (1909), and Tett, Jackson, and Rothstein (1994).

The research of Ackerman and Heggestad (1997) concluded that intelligence, personality, and interests are overlapping traits that explain the total person.

They state:

> *It seems to be reasonable to propose that development of personality-interest-intelligence traits proceeds along mutually causal lines. That is, abilities, interests, and personality develop in tandem, such that ability level and personality dispositions determine the probability of success in a particular task domain, and interests determine the motivation to attempt the task (p. 239).*

Further, Ackerman and Beier (2003) found that these traits worked in concert to help with career choice and vocational guidance. *The Standards for Educational and Psychological Testing* (American Educational Research Association, 1999) also pointed out that

behavior in work settings is influenced by individual characteristics such as abilities, personality, and attitudes (p. 155).

The early work of Parsons (1909) in the area of person-environment fit supports the use of personality characteristics as predictors of occupational success. Tett, Jackson, and Rothstein (1991) concluded that personality is a key factor in job performance. Foster (2003) found that combining personality scales (e.g., interaction effects, profile analysis) is more effective than using scales in isolation and better describes how personality scales may be used in personnel selection settings.

Holland's person-environment typology theory, "one's motivation for work can be associated with various interest categories," has withstood the test of time in the literature. Holland's theory has been described as internally consistent and easy to apply to most positions (Gottfredson, Holland, & Ogawa, 1982). The ease of understanding has its roots in Holland's division of the world of work into six comprehensive themes.

The assessment of cognitive abilities is common in job selection because research shows ability affects job success (Hunter & Hunter, 1984). The seminal work of Hunter and Hunter found that "... ability tests are valid across all jobs in predicting job proficiency," (p. 80). The works of Ghiselli (1973) and Vineberg and Joyner (1982) corroborate the findings of Hunter and Hunter.

Benchmarking the performance of successful workers is a common practice in many professional and industrial fields (Zairi, 1994). Characteristics of top performers are identified and used to establish the criteria against which all workers are evaluated. Medical research uses benchmarks to measure the performance of physicians and to show that feedback on the quality of care from patients improved significantly (Kiefe, Allison, Williams, Person, Weaver, & Weissman, 2001). Hermann and Provost (2003) also found the strengths in using benchmarks are that they represent excellent, yet achievable, performance and are derived by using objective and reproducible methods. In describing the use of benchmarks, Hamilton, Filgo, and Hines (2008) state, "The idea (of benchmarking) is that some people better perform a job because they are better suited to perform it. They share a quality that bottom performers do not."

There is ample empirical evidence supporting the premise that the more comprehensive the assessment process, the better the employment decision is for the individual and for the organization. In the next section, the components of the PXT are described.

The Behavioral Traits Section

A growing body of literature demonstrates the efficacy of using personality or behavioral characteristics to predict job success. In the early 1990s, the use of personality in job selection received encouragement when the U. S. government examined the adverse

impact of job selection methods. Measures of behavioral characteristics tend to have less adverse impact than other assessment methods (Hattrup, Rock, & Scalia, 1997; Murphy & Shiarella, 1997; Schmitt, Rogers, Chan, Sheppard, & Jennings, 1997).

In isolation, the presence of a particular personality trait is not necessarily good or bad. The degree to which a personality trait is found in an individual can significantly influence his or her success in a job. Individuals who possess the desired traits for a job tend to be more comfortable in the position than those who are forced to behave in a manner inconsistent with their personality. Parsons (1909) asserted that a good fit between the individual and his environment resulted in positive outcomes not only for the individual, but also for the organization. More recently, studies have shown person-job fit is a good predictor of effective employee commitment as well as effective and productive job performance (Greguras & Diefendorff, 2009).

The nine behavioral traits measured by the PXT were selected after exploratory factor analysis separated the base set of items into nine distinct components. The factorability indicators were good and the residuals indicated a good solution. The components and the resulting scale names are shown in Table 2.1.

Table 2.1

Factors Identified for Behavioral Traits

Component	Behavioral Trait	Variance Explained
1	Assertiveness	4.25%
2	Decisiveness	4.09%
3	Independence	3.95%
4	Sociability	3.87%
5	Energy	3.50%
6	Attitude	3.28%
7	Manageability	2.97%
8	Objective Judgment	2.35%
9	Accommodating	2.27%

The Interests Section

The PXT uses Holland's six constructs—Realistic, Investigative, Artistic, Social, Enterprising, and Conventional—to measure occupational interest. Holland's "Vocational Preference Inventory" (1985b) and the body of supporting research have emerged as the standard for measuring one's work interest. The PXT Interest section is Holland-influenced and measures an individual's level of interest in six major occupational themes. The themes are:

ProfileXT® Themes	**Holland Constructs**
1. Enterprising	Enterprising
2. Financial/Administrative	Conventional
3. People Service	Social
4. Technical	Investigative
5. Mechanical	Realistic
6. Creative	Artistic

These themes parallel those found in Holland's typology, which are widely accepted as important factors in job success. The names of the themes in the PXT are updated to make them more relevant to modern business and industry. The PXT identifies the top three occupational interests and describes their role in an individual's work functioning.

The Cognitive Abilities (Thinking Style) Section

The early work of researchers (Terman & Merrill, 1960; Thurstone, 1938; Wechsler, 1944) provided important information about the relationship between job success and cognitive abilities. Recent studies revealed a link between the results of standardized cognitive abilities tests and work behavior (Dilchert, Ones, Davis, & Rostow, 2007). The PXT measures cognitive abilities because it is important that the cognitive demands of the job align with the abilities of the individual. The research of Rode, Arthaud-Day, Mooney, Near, and Baldwin (2008) pointed to general mental ability as one of the strongest predictors of job performance.

Scoring the PXT

In the PXT scoring system, raw scores are converted to scaled scores and reported as STEN (Standard Ten) scores, which are normally distributed across the working population. Roughly two-thirds (68%) of the scores will fall between 4 and 7, which is within one standard deviation of the STEN scale mean score.

As an example, Table 2.2 shows the conversion of raw scores to scaled (STEN) scores for one of the Behavioral Traits scales from the PXT.

Table 2.2

PXT Raw Score to STEN Score Conversion Example

Raw Score	STEN Score
0 to 3	1
4 to 6	2
7 to 9	3
10 to 12	4
13 to 16	5
17 to 19	6
20 to 21	7
22 to 24	8
25 to 26	9
27 to 28	10

STEN scores are used to define the relative level of a given PXT trait found in the respondent. A score range that correlates best with high job performance is used to build the Performance Model.

Performance Models

For a given position, all three sections of the PXT are available for job matching; however, only a few of the scales are typically most critical for a given job. The scores on these critical scales differentiate individuals of varying levels of job performance. The composition of this subset of critical scales will differ across jobs.

Because the PXT scales measure different facets of job competency, a Performance Model is needed. A specific model depends on the requirements of a given job and work setting. By standardizing the job match process, the Performance Model reveals more than individual scale scores. The job matching process for the PXT minimizes the time required to describe jobs, people, and how well they fit together. The process starts with an examination of the score patterns of incumbents who are most successful and those who are least successful for a specific job. The identified pattern of scores across the PXT scales serves as the initial model, or benchmark, upon which the job matching is based.

The job fit matching process matches an individual's criterion-related performance measures with his or her PXT results. The analysis leads to the construction of Performance Models. By using the appropriate job performance criterion, the models help differentiate between top and bottom job performers. The client (assessment-user) provides the job performance criterion. The assessment-user may be the manager or supervisor of the incumbents who were tested. The assumption is that the client possesses the necessary expertise and knowledge about the job and the work performance of the incumbents to provide meaningful information about good job performance.

The clients are tasked with building the Performance Model for their organization. They apply the PXT results from two groups of incumbents with different job performance levels to build a Performance Model. This

model identifies the characteristics that differentiate these two groups. All incumbents in the position are then matched against this benchmark to validate the Performance Model for the position. This Performance Model may then be used to provide additional information about job applicants. The Performance Model exercise is conducted periodically to ensure the currency of the model.

Using a Performance Model makes it easy to identify the degree of fit between individuals and the expectations of the job. This information is useful for job placement, job training, and individual development. The models also help to determine when more information may be required. In these instances, interview questions are provided for use with the applicants (Performance Model Comparison report) and comments for discussion for the supervisors of incumbents.

Rationale for Performance Models

Results from a sample of 2,053 job applicants were compared by job type to provide a rationale for the use of Job Match Percents to measure job fit. Individuals in the sample were classified according to the type of job for which they applied. The job categories were:

- Unskilled
- Skilled Trade
- Clerical
- Management
- Professional

- Sales
- Customer Service

A factor analytic approach was employed to verify that the PXT scale loadings on the specific job types differed and thus required different models. The factor loadings showed that the PXT scales accounted for 26 to 34 percent of the variance within job types.

These findings revealed that the PXT scales accounted for similar amounts of variance across occupation types but did so in different scale combinations. In the Unskilled category, Decisiveness loads negatively, suggesting that jobs in this category attract people with lower levels of decisiveness. In the Professional category, Decisiveness loads positively, suggesting that those with higher levels of decisiveness apply for these jobs.

The loadings across the job categories illustrate how people who apply for and work in different occupational fields possess different characteristics. This is understandable because the nature of work differs across occupational types. In some categories, higher levels of certain traits constitute a stronger correlation to the job, while in others, lower levels of the same traits contribute more to job fit. The first factor loadings illustrate the bidirectional nature and variability of traits associated with different job types. Tables 2.3a through 2.3c show the scales in each of the three sections with a first factor loading of .300 or greater for each job type (absolute value).

Table 2.3a

PXT Behavioral Traits Scales by Occupation Type

			First Factor Scale Loadings								
Occupation Type	N	First Factor Variance Explained	Dec	Eng	Ast	Soc	Man	Att	Acc	Ind	OJ
Unskilled	117	7.00%	-.508	-.381	-302	.438	.390		.402	-.398	
Skilled Trade	210	5.00%	.365	.372	.402		-.395		-.415	.403	.307
Clerical	184	5.00%	.467		.367	.456		-.351		.315	
Management	736	4.00%		-.319	.308	.517					-.377
Professional	296	5.00%	.300	-.334	.302	.495					.311
Sales	394	4.00%			.337		-.429			.523	
Customer Service	116	5.00%		-.360			.479	.395	.338	-.417	.347
Total	2,053										

Note: Dec = Decisiveness; Eng = Energy; Ast = Assertiveness; Soc = Sociability; Man = Management; Att = Attitude; Acc = Accommodating; Ind = Independence; OJ = Objective Judgment

Table 2.3b

PXT Interests Scales by Occupation Type

			First Factor Scale Loadings					
Occupation Type	N	First Factor Variance Explained	Ent	Fin	PS	Tec	Mec	Cre
Unskilled	117	10.00%	-.306	-.489	-.509	-.390	.652	-.310
Skilled Trade	210	9.00%	-.476		-.446	-.387	.550	
Clerical	184	8.00%	.567		.388	-.376		.485
Management	736	6.00%	-.420	-.427		.341	.456	
Professional	296	8.00%		.543	-.389	.447	.396	-.443
Sales	394	11.00%	.690		.619	-.353	-.388	
Customer Service	116	10.00%		-.360			.479	.395
Total	2,053			.460	.429	.302	-.325	.498

Note: Ent = Enterprising; Fin = Financial/Administrative; PS = People Skills; Tec = Technical; Mec = Mechanical; Cre = Creative

Table 2.3c

PXT Thinking Style (Cognitive) Scales by Occupation Type

		First Factor Scale Loadings				
Occupation Type	N	First Factor Variance Explained	VS	VR	NA	NR
Unskilled	117	8.00%	.392		.433	
Skilled Trade	210	9.00%			.543	.450
Clerical	184	9.00%	.401		.447	.488
Management	736	7.00%		.324	.401	.504
Professional	296	8.00%		.356	.459	.402
Sales	394	9.00%	.466		.411	.432
Customer Service	116	8.00%	.435	.493	.516	
Total	2,053					

Note: VS = Verbal Skill; VR = Verbal Reasoning; NA = Numerical Ability; NR = Numeric Reasoning

Building Performance Models

The Performance Model, or benchmark, identifies the characteristics that differentiate between top and bottom performers for a given job.

The first step requires the client to identify the criterion for good job performance. The client defines quantitatively the performance expected from employees. Some examples of quantifiable job performance measures include sales quota efficiency, error rates, product production levels, and customer complaints. Often, the job performance measures relate to the present problem with which the client is concerned (e.g., poor productivity, high turnover, frequent customer complaints).

With good job performance measures and the use of criterion validity studies, (e.g., concurrent investigations), it is possible to separate the top performers from others in a given position.

The next step is to identify the characteristics of both the top performers and bottom performers using the PXT software. This is done in a two-step process. Once top performers are identified, the system produces a preliminary Performance Model that considers the various characteristics of the top performers' scores. The bottom performers are also identified, and the system builds a preliminary Performance Model for this group. The resulting Performance Models are then compared to help identify the characteristics that differentiate the two groups. With these data, an effective Performance

Model is developed for use in assessing applicants for the position.

Examples of the results from this process are shown in Figures 2.1 to 2.3. Figure 2.1 displays the distribution of the results for the top performers by indicating how many scored at each STEN level (i.e., 1 scored a 5, 2 scored a 6, 3 scored a 7, etc.), and Figure 2.2 shows the distribution of the results for the bottom performers (i.e., 1 scored a 2, 2 scored a 3, etc.). These results are graphed in Figure 2.3 with the results for bottom performers shaded red and the results for top performers shaded blue. The preliminary Performance Model is indicated as 5, 6, 7, and 8 (shown shaded in yellow).

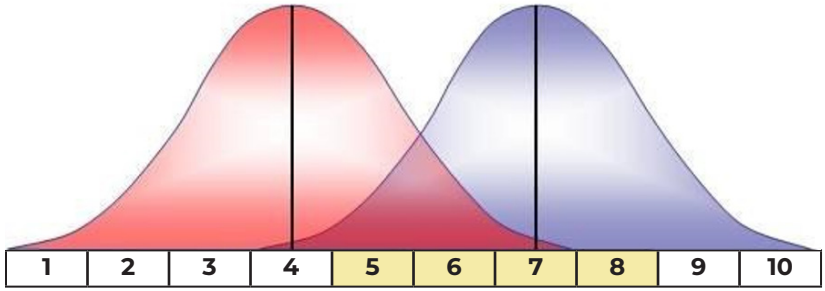
Figure 2.1: Representation of Top Performer STEN Scale
For the top performers, the Performance Model (blue) is toward the high end for this trait. Note that the STEN scores are shown in the top row and the number of subjects who scored at each STEN level in the bottom row.

STEN score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Subjects					1	2	3	3	2	1

Figure 2.2: Representation of Bottom Performer STEN Scale
The Performance Model for bottom performers (red) is toward the low end for this trait.

STEN score	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Subjects		1	2	3	3	2	1			

Figure 2.3: Representation of STEN Scores for Two Groups of Employees
The results for bottom performers are shaded red and the results for the top performers shaded blue.



While there is an overlap of scoring for these two groups, it's clear the top performers scored higher on this particular scale. In this example, the analysis suggests a Performance Model STEN score range of 5 to 8 for this scale. In other words, the analysis expects those with a good match to this position to possess STEN scores of 5, 6, 7, or 8. This means the system will reduce the Job Match Percent for those falling outside of this range of scores (5 to 8). While the range will include some bottom performers, the goal of the initial model is to be more inclusive until additional data allow greater differentiation.

These results define the amount of a particular trait a respondent should possess for job success. Using this information, a Performance Model for each scale (or characteristic) in the PXT can be built. This model consists of a range along each scale on which the scores of the most effective performers tend to fall. Because

they are not absolute, the typical model will be three to five units wide. The more outside this range a score falls, the less likely there will be a good fit of the individual to the job, and the resulting Job Match Percent will be lower.

A flowchart of the process for building a Performance Model and using it in a criterion study is found in Figure 2.4. The descriptions of the steps are expanded here:

Steps for Building a Performance Model

1. *Select Position.* The client selects a position for which to build a Performance Model. The position should be specific and easy to identify, such as route salesperson or counter salesperson, rather than the more generic title of salesperson.

2. *Identify Employees in Position.* Employees assigned to the identified position should be assessed.

3. *Define Successful Performance Criterion.* Define the criterion for job success in behavioral and quantifiable terms. A criterion such as "makes good sales" is ineffective because it lacks clarity and is not quantifiable. A better choice would be "sales greater than quota last year."

4. *Assign Job Performance Score.* Assign a score to each employee based on his or her match to the performance criterion.

5. *Classify Employees Based on Match to Criterion.* Classify each employee into three groups—top

performers, middle performers, and bottom performers—according to the quantifiable criterion established in Step 3.

Note: While top and bottom performers are used to determine the Performance Model, middle performers are tracked to analyze the overall veracity of the benchmark.

6. *Administer the PXT.* Have all employees complete the PXT so their results are available for the remaining steps.

7. *Create Top and Bottom Performance Model from PXT Results.* Build separate Performance Models for the top and bottom performers. These will be used to identify the characteristics that help differentiate between the members of each group.

8. *Create Preliminary Performance Model for Matching to Position.* Once a Performance Model is built, all participants (top, middle, and bottom) are matched to the pattern. This process yields a Job Match Percent for each employee.

The next step is to inspect the Overall Job Match Percent for each employee in the position and combine this information with the criterion value established in Step 4. These two values are then analyzed to determine the strength of the relationship between job fit and performance.

9. *Gather PXT and Job Performance Scores for All Employees.* The two general variables considered in the criterion study are job performance (from the

employer's assessment in Step 4) and the PXT scores for each employee.

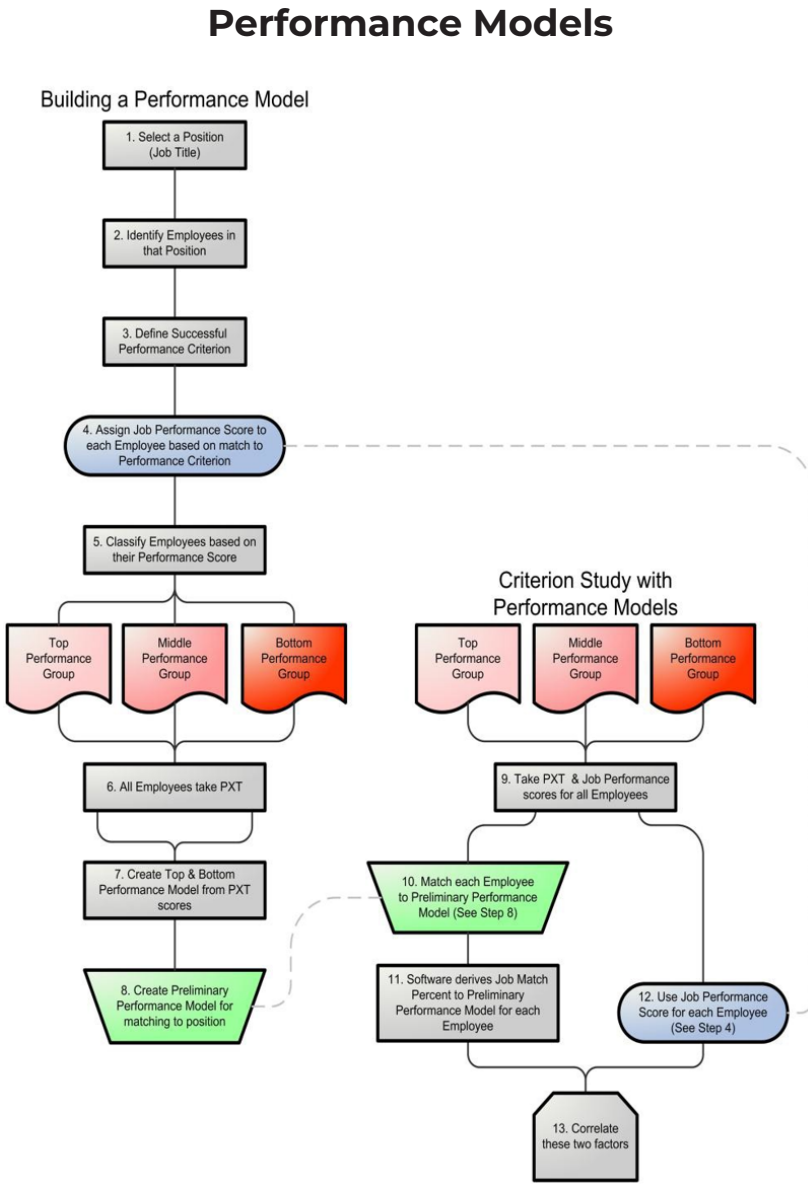
10. & 11. *Match Each Employee to the Preliminary Performance Model* (created in Step 8). Once each employee is matched to a Performance Model, a Job Match Percent is computed. This Job Match Percent reflects the degree of fit for the employee to that particular Performance Model, where the higher the percent match, the greater the match to the model. This Job Match Percent is the dependent variable for the criterion studies.

12. *The Job Performance Score* (from Step 4) for each employee is the independent variable for the criterion studies.

13. *Correlate the Job Match Percent with Performance*. Appropriate statistics are used to correlate the Job Match Percent scores and the job performance scores. This is the basic design of the validity studies conducted by PXT clients.

Figure 2.4 graphically illustrates these steps.

Figure 2.4: Flow Chart for Building a Performance Model and Using It in a Criterion Study



The PXT Performance Model Library

The PXT online services include a library of Preliminary Performance Models for clients to utilize when developing models for their companies. This library is populated with more than 1,000 job titles and provides preliminary models for selecting top performers. Library models are used only as a basis for the development of a local model. They simply give clients a place to start.

Each model in the library was derived by a multi-step process conducted by a team of psychologists and other hiring professionals tapping into real-world resources. The process of isolating these models included three important steps:

- An extensive review of over 300,000 models, currently in use by our clients, were grouped by job title and compared within each group for commonalities. The consensus of these models helped to create a large base of generalized models from which to proceed.
- A review of information gathered by the Department of Labor through the Occupational Network (O*Net) concerning the list of job titles we had gathered. This information guided the panel through the next step in the process.
- Finally, with a set of generalized models derived from real-world users and information from O*Net, our panel of professionals modified each model with a focus on balancing relevance and inclusiveness.

> The goal was to provide clients with relevant models from which to start building their specialized and company-tailored models.

The inclusiveness of the Preliminary Performance Models helps to ensure that if a client has minimal information about their top and bottom performers, they will at least have a model based on the success of others in their field and avoid being unnecessarily exclusive in their model development. During this stage in the process, it is better to include a few who may not fit well in the job than it is to exclude any candidates who are a true fit to the position. As more information is gathered about the job and employee performance, both the model and the candidate selection process will be refined as adjustments are made to the Performance Model. This process is addressed in greater detail in the PXT User's Guide.

The Job Match Percent

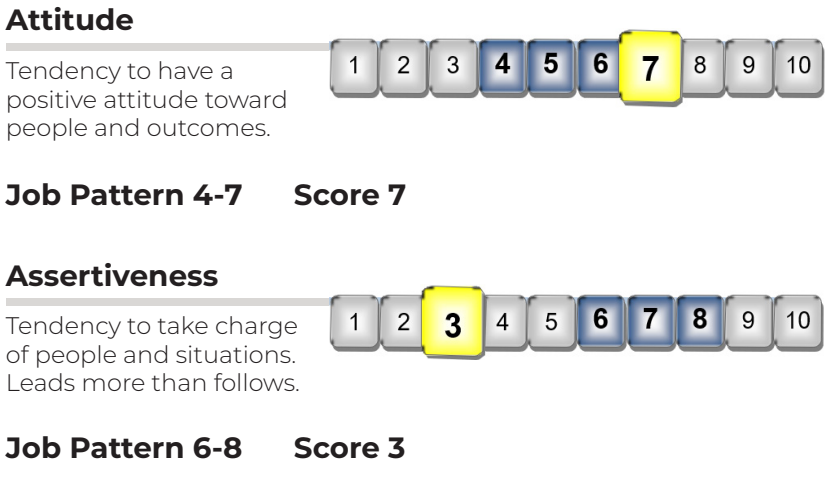
The Overall Job Match Percent is derived by pairing the respondent's scores on each scale to a Performance Model for a specific position. If the scores fall outside the benchmark or model for a scale, the impact lowers their Job Match Percent. The farther the score falls outside of the model, the greater the negative impact on the Job Match Percent. This applies whether the respondent's score is above or below the model. Thus, those respondents with scores closely matching the model of scores defined for the position are assigned a higher

percent match than those whose scores fall outside of the model (Hamilton & Wilson, 2007).

In the computer-generated narratives, job match is reported as a percent match to a specific Performance Model. A high STEN score on any specific scale does not necessarily lead to a better job match than a low STEN score on the scale; it is the congruence between the candidate's scores and the range of scores of the job model that determines the candidate's Job Match Percent. This allows for variation between persons who may share a good fit to a position.

Figure 2.5 illustrates the job matching process. The first figure shows a Performance Model of 4 - 7, with a score of 7 falling within the model. The second example shows a score of 3 falling outside (below) the Performance Model of 6 - 8.

Figure 2.5: Representation of Performance Modeling Process



Once a good Performance Model is established, it may be used to evaluate anyone who takes the PXT. The Performance Model is composed of a range of scores for each scale. This range represents the area in which those who are expected to fit easily into the job actually score. The farther outside this range (model) a score falls, the less likely there is a good fit of the individual to the targeted job. Job Match Percentage points are deducted for scoring outside the model. As mentioned earlier, job match is reported as a percent match to a specific Performance Model.

The Overall Job Match Percent will range from 0% to 100%. A separate match will be provided for each of the three areas (Thinking Style, Interests, and Behavioral Traits), as well as the Overall Job Match Percent. The Overall Job Match Percent is especially useful to identify individuals who may be a good match for the job. The percent matches for the three subsections can be used for a more in-depth analysis of job fit. The higher the reported match, the higher the expectancy the individual will fit well into the job under consideration.

Client-sponsored criterion validity studies have demonstrated that those individuals with high Overall Job Match Percents have a greater probability of success in the targeted position than those with low Overall Job Match Percents.

Understanding the Percentage Match to a Performance Model

The PXT displays an Overall Job Match Percent to a selected Performance Model. This Job Match Percent

number allows for the comparison of an individual's results with a theoretical individual who is an exact match to a specified Performance Model.

A formula is used to calculate the overall match. The result of this computation is influenced by several factors, including the number of scales under consideration, the width of the model for each scale, and the number of scales in a given section (e.g., Thinking Style, Interests, and Behavioral Traits). Understanding the formula is not necessary to understand the process.

For the purpose of illustration, let's simplify the computations and just assume everyone starts with a percentage match of 100 to the model under consideration.

Initially, each scale is considered separately. If the individual's score falls anywhere inside the specified model, no action is taken; however, if they score outside the model, points are subtracted from the overall match. As the obtained score falls farther from the model on any scale, more percentage match points are deducted from the original 100 points.

If the model was from 6 to 8, and the obtained score was a 6, 7, or 8, the overall match would not be affected. If the obtained score was a 5 (one STEN outside of the model), then two match points may be deducted, while an obtained score of 4 might cause a deduction of three match points (the actual values subtracted would be a function of the analysis, which considers all the models

for all of the scales). Once each scale in a section has been considered, the total match for that section is computed.

Because the overall match to a Performance Model may be part of placing an individual in a job (up to 1/3 of the decision), comparing the overall match for several individuals who are also under consideration for the targeted job is appropriate. The greater the overall match percent number, the greater the probability the individual will successfully fit to the job under consideration.

Overall match scores for applicants on a given assessment are compared with one another to provide information on relative job fit. This information is an important part of the process of making placement decisions.

For example, there might be four individuals under consideration for the same position. Their PXT results may result in Overall Job Match Percent scores of 94, 87, 72, and 68. It is easy to see which individual is the closest match to the Performance Model.

The reports provided by the PXT will help guide the assessment-user by providing interview questions related to the scales when the applicant scores outside the Performance Model. In a placement situation, these interview questions can enrich the quality of the interview by providing focus on areas for potential difficulties associated with the fit to the job.

Because the interpretations generated by the PXT are provided in reports written in common language, they require no interpretation by the assessment-user. This allows the PXT to be used by those with no special training.

While this Performance Model approach to matching individuals to a job provides valuable information that should be used in placement decisions, the results should not be a sole source when making final placement decision (American Educational Research Association, 1999).

Summary

In this chapter we have noted research demonstrating that individual characteristics can be linked to success on the job. The more closely an individual's personality, interests, and abilities align with the characteristics of those who have demonstrated success in a particular job, the greater the chance the individual will also be successful. As discussed in the next chapter, our research shows that by measuring the individual characteristics (Behavioral Traits, Interests, and Thinking Style) of successful persons, the PXT allows a picture to be drawn of the ideal worker for a particular job. Each job applicant or incumbent can then be compared to this picture (Performance Model) to determine the degree of fit. Once this fit is understood, decisions regarding placement or professional development may be made with much more accuracy.

Chapter 3: Psychometrics

This chapter describes the psychometric characteristics of the PXT's three assessment domains. The norm sample includes respondents from the general population of working people in the United States. The population includes workers in occupations ranging from unskilled labor to highly specific professional and technical jobs. The variety of respondents, job positions, and businesses attests to the versatility of the PXT as an assessment tool for the human resource practitioner. Table 3.1 describes the demographics of the PXT's norm sample. It should be noted that while providing demographics is voluntary, over 75% of respondents chose to provide this information.

Norming Sample

Table 3.1

ProfileXT® Norm Sample Distribution (N=377,259) collected from 03/23/2017-07/31/2019

Gender	Frequency	Percent
Female	174,830	46.3%
Male	193,183	51.2%
Transgender female	6	0.0%
Transgender male	5	0.0%
Non-binary	9	0.0%
Prefer not to identify	69	0.0%
Prefer to self-describe	6	0.0%
No response	9,151	2.4%

Ethnicity	Frequency	Percent
White, not of Hispanic origin	225,519	59.8%
Asian or Pacific Islander	17,430	4.6%
Black, not of Hispanic origin	51,050	13.5%
Hispanic	45,927	12.2%
American Indian or Alaskan Native	2,315	0.6%
Other	11,927	3.2%
No response	23,091	6.1%
Age Range	Frequency	Percent
0-39	246,895	65.4%
40-66+	75,156	19.9%
No response	55,208	14.6%

Descriptive statistics and other analyses are presented for each PXT component.

Behavioral Traits

Descriptive Statistics

Table 3.2 summarizes descriptive statistics for the ProfileXT® Behavioral Traits component on a recent sample of 377,259 respondents. Although Table 3.2 contains sample statistics, the extreme size of the sample suggests these values are approximations of population parameters.

Table 3.2

ProfileXT® Behavioral Traits - Raw Scores Descriptive Statistics (N=377,259)

ProfileXT Scales	Mean	Standard Error	Standard Deviation	Min.	Max.
Decisiveness	7.61	0.01	3.18	0	15
Energy	5.03	0.00	2.97	0	14
Assertiveness	12.78	0.01	3.60	0	20
Sociability	12.31	0.01	3.63	0	17
Manageability	18.69	0.01	3.50	0	24
Attitude	18.32	0.01	4.18	0	24
Accommodating	14.20	0.00	2.97	0	19
Independence	5.80	0.01	3.72	0	18
Objective Judgment	15.55	0.01	3.20	0	20

Coefficient Alpha Reliability Analysis

Coefficient alpha estimates the degree of interrelatedness of the items in a scale. The larger the estimate, the more homogenous the item content. A scale with a low coefficient estimate produces results that can be difficult to interpret with confidence.

Table 3.3 shows the reliability estimates for the Behavioral Traits scales. The results point to scales that are built with highly related item content. These results add confidence to the effort to draw inferences about the respondent's personality from scale scores.

Table 3.3 reports reliability estimates for the PXT ranging from .72 to .84. The mean estimate for the behavioral domain is .76. These estimates are stable and moderately high for all Behavioral Traits scales.

Table 3.3

ProfileXT® Behavioral Traits Scales Coefficient Alpha Reliability (N=377,259)

ProfileXT Scales	Coefficient Alpha
Decisiveness (D)	0.72
Energy (E)	0.72
Assertiveness (A)	0.74
Sociability (S)	0.84
Manageability (M)	0.73
Attitude (At)	0.81
Accommodating (Ac)	0.72
Independence (I)	0.80
Objective Judgment (O)	0.74
Mean	0.76

Test-retest Reliability

Although internal consistency reliability estimates for the various sections of the PXT are favorable, it is important to determine the temporal consistency of the PXT. The test-retest method requires the administration of the PXT to a group of individuals on two separate occasions and the comparison of results for the two administrations. A fixed temporal distance between the two administrations is ideal but in practical settings is difficult to achieve. When the time between administrations does vary, it is usually no more than one to six months.

The results of two test-retest studies (Hamilton & Shaw, 2008) are summarized below.

Test-retest Studies with Employees from the Workforce
In the first study, the PXT was administered to 88 employees of a manufacturing company on two separate occasions. Table 3.4 displays the employee characteristics. Employees completed the PXT on a computer. The time between the two administrations was six to seven weeks, with an average of 6.7 weeks.

Table 3.4

ProfileXT® Test-Retest Sample Demographic Distribution (N=83)

Gender	Percent
Male	48.2
Female	51.8
Ethnicity	
White	83.2
Black	6.0
Hispanic	7.2
Other	3.6
Educational Level	
Didn't Graduate H.S.	6.0
High School Grad.	16.9
Some College	39.8
Assoc. Arts Degree	15.6
College Degree	39.8

Table 3.5 contains the correlation results for each scale.

Table 3.5

ProfileXT® Test-Retest Study Results (N=83)

ProfileXT® Scales	Test-retest Correlation
Behavioral	**.84**
Decisiveness	.83
Energy	.88
Assertiveness	.91
Sociability	.75
Manageability	.77
Attitude	.88
Accommodating	.83
Independence	.85
Objective Judgment	.87

These results show that the Behavioral Traits scales scores remain stable over time with a mean correlation of 0.84. In the second study, test-retest reliability was estimated using 108 employees in various occupations in the United Kingdom. No demographic data were available on the respondents due to privacy regulations. They were administered the PXT on a computer. The time between the two administrations was three to six months with an average of 4.7 months. Table 3.6 contains the test-retest correlation estimates.

Table 3.6

ProfileXT® Test-Retest Study Results[1] (N=108)

ProfileXT® Scales	Test-retest Correlation
Behavioral	**.82**
Decisiveness	.85
Energy	.80
Assertiveness	.79
Sociability	.90
Manageability	.75
Attitude	.87
Accommodating	.74
Independence	.80
Objective Judgment	.86

[1] United Kingdom sample

These results reinforce the temporal stability of the PXT Behavioral Traits scales.

Construct Validity

Construct validity refers to the extent to which an assessment and its scales are a relevant measure of a well-defined trait. Construct validity addresses the question, "How well does the assessment meet its intended purpose?"

Although there are different methods for evaluating construct validity, two of the most informative methods include examining the correlation coefficients among the scales within the instrument and between the instrument and other psychological instruments that measure the same constructs. The inter- and intra-

correlation matrices are expected to show patterns that answer questions about the convergence and divergence of scales within the PXT as well as with other assessment instruments. From these matrices of correlation coefficients it is possible to discern how closely a scale measures what it purports to measure and what it does not measure. Scales that measure related personality constructs are highly correlated, whereas scales that measure unrelated constructs are marginally correlated.

Correlation with Other Assessments

This section of the *PXT Technical Manual* examines the relationships between the ProfileXT® and two measures of adult normal personality, the Guilford–Zimmerman Temperament Survey (1978) and the Gordon Personal Profile – Inventory (1978).

The Guilford-Zimmerman Temperament Survey (GZTS)

The GZTS is a well-researched personality assessment that is used in vocational guidance and counseling and in occupational psychology (Kline, 1993). Many occupational psychologists and personnel professionals apply the GZTS to measure attributes of personality and temperament that predict successful performance in various occupations. Table 3.7 lists the ten GZTS scales along with brief scale descriptions.

Table 3.7

GZTS Scale Descriptions

GZTS Scale	Description
General Activity	Fast vs. slow
Restraint	Self-control vs. impulsiveness
Ascendance	Dominance vs. submissive
Social Interest	Outgoing vs. shy
Emotional Stability	High vs. low
Objectivity	Objective vs. subjective
Friendliness	Friendly vs. aggressive
Thoughtfulness	Think it through vs. act it out
Personal Relations	Positive vs. negative
Masculinity/Femininity	Interest in masculine vs. feminine activities
Vigor	High vs. low activity

The PXT and the GZTS were administered to 540 job applicants and incumbents over a one-year period. The correlations between the nine ProfileXT® and the ten GZTS scales produced many coefficients that were statistically significant. Some of the significant correlations may be due to the large sample size. To control for sample size, Table 3.8 displays only coefficients of .40 or higher (absolute value).

Both the PXT and the GZTS measure factor-derived personality dimensions and include scales with similar names. According to Table 3.8, the patterns of correlations between the PXT and the GZTS are consistent with what the scales purport to measure. For example, six of the PXT scales correlate with six of the

GZTS scales. These scales are restated in Table 3.9 and are common to all versions of the PXT instrument.

Table 3.8

PXT and GZTS Correlations (N = 540)

	PXT Scales						
GZTS Scales	Energy	Assert	Social	Acc	Att	Ind	Obj
General Activity	.79						
Restraint							
Ascendance		.68	.42				
Social Interest							
Emotional Stability							
Objectivity				.49			
Friendliness				.79	.45	-.49	
Thoughtfulness							
Personal Relations				.60	.74		
Masculinity/ Femininity							

Note: All correlations significant at the .05 level, or less.

Table 3.9

PXT and GZTS Correlations (N=540)

PXT	GZTS	Correlations
Energy	General Activity	.79
Assertiveness	Ascendance	.68
Sociability	Social Interest	.80
Objective Judgment	Objectivity	.69
Accommodating	Friendliness	.70
Attitude	Personal Relations	.74

The PXT Sociability and the GZTS Ascendance scales share an interpersonal/social orientation. Positive relationships were also found between the PXT Attitude and GZTS Personal Relations scales and between PXT Accommodating and GZTS Friendliness scales. The overlapping variance among these four scales support the view that friendly and accommodating people have a positive attitude when compared to people who were less friendly and accommodating.

The strong and negative relationship between the PXT Independence and GZTS Friendliness scales highlights the view that independent, self-sufficient people are less cooperative, accommodating, and agreeable. This impression is less a criticism of their work style as it is a reflection of the way their personality influences their approach to carrying out the work of the organization.

Gordon Personal Profile – Inventory (GPP-I)

The GPP-I provides a description of personality functioning through its eight personality scales. The GPP-I is a self-report questionnaire that is used in business settings (Gordon, 1978). Table 3.10 briefly describes the eight personality scales.

Table 3.10

GPP-I Scale Descriptions

GPP-I Scale	Description
Ascendancy	Active vs. passive role in group situations
Responsibility	High vs. low
Emotional Stability	High vs. low
Sociability	Socially outgoing vs. shy
Cautiousness	Careful vs. impulsive
Original Thinking	Innovative vs. conventional
Personal Relations	Positive vs. negative
Vigor	Energetic vs. laid-back

The PXT and the GPP-I were administered to 320 respondents over a one-year period. Table 3.11 contains the intercorrelations among the nine PXT scales and the eight GPP-I scales. According to the data, the patterns of correlations meet expectations.

Table 3.11

GPP-I and the PXT Correlations (N = 320)

	PXT Scales						
GPP-I Scales	Energy	Assert	Social	Acc	Att	Ind	Obj
Ascendancy		.72	.65				
Responsibility							
Emotional Stability							.70
Sociability		.52	.85				
Cautiousness							
Original Thinking							
Personal Relations				.44	.40		.45
Vigor	.67						

Five PXT scales are related to five of the GPP-I scales. These scales are recapped in Table 3.12.

Table 3.12

GPP-I and PXT Correlations

PXT	GPP-I	Correlations
Energy	Vigor	.67
Assertiveness	Ascendancy	.72
Sociability	Sociability	.85
Attitude	Personal Relations	.40
Objective Judgment	Emotional Stability	.70

Correlations of the GPP-I Ascendancy scale with the PXT Assertiveness and Sociability scales are significant. The relationship between the GPP-I Personal Relations scale and the PXT Attitude scale describes one of trust in people and outcomes.

The positive relationship between the PXT Objective Judgment scale and the GPP-I Emotional Stability scale points to individuals who are emotionally stable with low levels of anxiety and nervous tension. They are more objective and logical than individuals who are emotionally labile.

For the most part, GPP-I Responsibility, Self-esteem, Cautiousness, and Original Thinking show little in common with specific PXT scales. This divergence from PXT scales is expected as these GPP-I scales measure different constructs.

The results confirm the predicted pattern of convergence and divergence of constructs among the PXT, the GZTS, and the GPP-I. Although measured with fewer items in the PXT, the current scales and their antecedent constructs are supported by the results of these analyses.

California Psychological Inventory (CPI)

Studies have been conducted on the relationships between the scales of the PXT Behavioral Traits and the California Psychological Inventory (Gough, 1975). The CPI was developed for use in counseling, industrial, and educational settings. Nineteen of the 23 scales were found to relate to PXT scales. An explanation of the CPI scales is found in Table 3.13, which defines the general interpretation of the high and low ends of each scale.

Table 3.13

CPI Scale Definitions

Low Scores	CPI Scale	High Scores
Unassuming, not forceful	Dominance	Confident, assertive, dominant, task-oriented
Unsure of self, dislikes direct competition	Capacity for Status	Ambitious, wants to be a success, independent
Shy, feels uneasy in social situations, prefers to keep in the background	Sociability	Sociable, likes to be with people, friendly
Cautious, hesitant to assert own views or opinions, not sarcastic or sharp-tongued	Social Presence	Self-assured, spontaneous, a good talker, not easily embarrassed

Low Scores	CPI Scale	High Scores
Self-doubting, readily assumes blame when things go wrong, often thinks others are better	Self-acceptance	Has good opinion of self, sees self as talented and as personally attractive
Lacks self-confidence, seeks support from others	Independence	Self-sufficient, resourceful, detached
Ill at ease in many situations, not empathetic	Empathy	Comfortable with self and well-accepted by others
Not overly concerned about duties and obligations, may be careless or lazy	Responsibility	Responsible, reasonable, takes duties seriously
Resists rules and regulations, finds it hard to conform, not conventional	Socialization	Comfortably accepts ordinary rules and regulations, finds it easy to conform
Has strong feelings and emotions and makes little attempt to hide them, speaks out when angry or annoyed	Self-control	Tries to control emotions and temper, takes pride in being self-disciplined
Insists on being himself or herself, even if this causes friction or problems	Good Impression	Wants to make a good impression, tries to do what will please others
Has difficulty in doing best work in situations with strict rules and expectations	Achievement via Conformance	Has strong drive to do well, likes to work in settings where tasks and expectations are clearly defined
Has difficulty in doing best work in situations that are vague, poorly defined, and lacking in clear-cut methods and standards	Achievement via Independence	Has strong drive to do well, likes to work in settings that encourage freedom and individual initiative
Has a hard time getting started on things and seeing them through to completion	Intellectual Efficiency	Efficient in use of intellectual abilities, can keep on a task where others might get bored or discouraged

Low Scores	CPI Scale	High Scores
More interested in the practical and concrete than the abstract, looks more at what people do than what they feel or think	Psychological-mindedness	More interested in why people do what they do than in what they do, good judge of how people feel and what they think about things
Not changeable, likes a steady pace and well-organized life, may be stubborn or even rigid	Flexibility	Flexible, likes change and variety, easily bored by routine life and everyday experience, may be impatient or even erratic
Opportunistic, outgoing, demonstrates initiative and confidence, aggressive	Internality	Reticent, shy, reserved, moderate, modest, and reluctant to initiate or take decisive social action
Sensitive, individualistic, informal, restless, distractible, seeks stimulation and adventure	Norm-favoring	Well-organized, conscientious, conventional, dependable, and controlled
Narrow interests, not ambitious, unemotional, apathetic, dull or blunt expression or thoughts, stolid, and commonplace	Self-realization	Moderate, mature, insightful, optimistic, having a high range of interests, reasonably fulfilled and actualized

Table 3.14

CPI/PXT Behavioral Traits Scales Correlations (N = 52)

	Energy	Assert.	Social	Man.	Att.	Acc.	Ind.	Obj.
Dominance	.562**	.667**	.418**	.041	.094	-.384**	.032**	.220*
Status	.343**	.382**	.295**	.094	.223*	-.168	.234*	.074
Sociability	.423**	.528**	.678**	.152	.258*	-.353**	.225*	.269**
Social Presence	.352**	.449**	.564**	.102	.226*	-.386**	.313**	.233*
Self-acceptance	.422**	.523**	.625**	-.003	.169	-.343**	.274**	.076
Independence	.299**	.471**	.256**	-.003	.169	-.343**	.344**	.347**
Empathy	.276**	.276**	.421**	.138	.200	-.049	.273**	.165
Responsibility	-.134	-.066	-.247*	.330**	.259*	.282**	-.262*	.174
Socialization	-.096	-.097	-.203*	.278**	.229*	.225*	-.238*	.141
Self-control	-.390**	-.330**	-.475**	.412**	.203*	.490**	-.381**	.282**
Good Impression	-.279**	-.244*	-.318**	.460**	.206*	.421**	-.374**	.363**
Achieve via Conform	.121	.135	-.142	.219*	.323**	.067	-.208*	.154
Achieve via Independence	-.100	-.001	-.012	.232*	.283**	.159	.069	.103

Intellectual Efficiency	.048	.068	.044	.248*	.235**	.072	.111	.233*
Psychological-mindedness	-.143	.011	.006	.382**	.273**	.123	-.011	.239*
Flexibility	-.045	-.012	.270**	.173	.264*	.110	.202	.038
Internality/Externality	-.586**	-.773**	-.635**	.110	-.001	.530**	-.451**	-.153
Norm Questioning/ Favoring	.092	.035	-.234*	.014	.015	-.051	-.206*	.069
Self-realization	-.019	-.039	.035	.468**	.442**	.268**	-.043	.292**

* significant at .05 level. **significant at .01 level.

As shown in Table 3.14, the PXT Behavioral Traits scales that emphasize social effectiveness correlate with CPI scales with a similar theme. Likewise, Behavioral Traits scales that emphasize compliance and accommodation are related to CPI scales of social responsibility. These findings suggest the PXT Behavioral Traits scales demonstrate good concurrent validity with the CPI scales.

PXT Inter-scale Correlations

The PXT measures nine dimensions of "normal" personality. Table 3.15 contains the intercorrelation coefficients for the nine PXT scales using a sample of 377,259 respondents.

Table 3.15

ProfileXT® Behavioral Traits scales correlations (N=377,259)

ProfileXT Scales	Interscale Correlations								
	D	E	A	S	M	At	Ac	I	O
Decisiveness (D)									
Energy (E)	.778								
Assertiveness (A)	.681	.343							
Sociability (S)	.255	.099	.430						
Manageability (M)	-.276	-.374	-.112	.229					
Attitude (At)	-.180	-.268	-.046	.246	.681				
Accommodating (Ac)	-.449	-.451	-.364	.008	.609	.438			
Independence (I)	.359	.410	.272	.077	-.586	-.271	-.504		
Objective Judgment (O)	-.159	-.320	.069	.240	.621	.411	.386	-.273	

According to Table 3.15, approximately one-fourth (8/36) of the correlations are less than .20, whereas approximately one-half (17/36) are below .30. In general, this shows that the nine constructs possess sufficient amounts of unique variance with a few exceptions.

The highest correlation is between the Energy and Decisiveness scales (.778). Several other scales appear related, and yet, even at the highest level of correlation, each scale offers a unique perspective for describing the individual. Following are a few of the scale pairings with some discussion of the interpretative meaning of scores for respondents.

Energy and Decisiveness Scales
High scores on the Energy and Decisiveness scales reflect a sense of urgency. Scores on the Energy scale offer insight about the respondent's need to be driven, to seek external stimulation, and to become engaged in activities.

Scores on the Decisiveness scale reveal a tendency to act without delay and with little appreciation of the risk of making a mistake due to a sense of urgency. The degree of relationship between these two scales supports the view that people who are spontaneous and decisive tend to act on their impulses, and that this urgency feeds into their high energy level.

Similarly, people who are not fast-paced, driven, or who do not seek stimulating experiences are disinclined to act decisively. The natural relationship of these traits is further supported in that some items load on both scales.

Individuals whose scores on Decisiveness and Energy are not positively related tend to demonstrate their stronger trait while being modulated by the other. High Energy people with low Decisiveness may become distracted by details that interfere with their ability to decide quickly. Highly decisive individuals with a low Energy may not express their sense of urgency, even when decision making comes easily, leaving others confused as to their level of commitment.

Assertiveness and Decisiveness Scales

The Assertiveness and Decisiveness traits are related to a person's level of self-confidence. High scores on the Assertiveness scale reflect a willingness to defend one's position and to remain steadfast in the stance one takes. High scores on the Decisiveness scale reflect a tendency to act with confidence and to see mistakes as merely a byproduct of a willingness to take risk and make choices when it is necessary. The degree of relationship between these two scales supports the view that decisive people express their positions with confidence. Similarly, people who are not firm in defending their actions are inclined to be irresolute and are uncomfortable being put into the role of decision maker.

Those individuals whose scores on Assertiveness and Decisiveness are inversely related tend to demonstrate their stronger trait while being modulated by the other. Highly assertive individuals with low Decisiveness scores may not take action quickly, instead preferring to be influential and are overly status conscious. Highly

decisive individuals with low Assertiveness scores may not be perceived as strong and convincing leaders but can act impetuously even when the situation calls for a more prudent approach.

Manageability and Attitude Scales
Scores from these scales relate to an individual's style of perceiving the actions, motives, and behaviors of others. Respondents with high scores on Manageability accept the authority of others and act compliantly. Respondents with low scores on Manageability avoid the restrictions of rules and procedures. High scores on Attitude describe those who are trusting and disinclined to suspect the intentions of others as harmful. Those with low scores on the Attitude scale rarely take the motivations and behaviors of others at face value. They are vigilant and wary.

Because the general tendency appears that high scores on Manageability may be related to high scores in Attitude, one could surmise that trust and compliance are related. Being wary of the agendas of others makes an individual wary of personal strictures and unquestioning devotion. These assumptions follow conventional wisdom even though the two traits are unique and separate concepts

The interesting situation is one in which an individual's scores do not follow the trend. For example, one is highly trusting (high Attitude) but low in compliance (low Manageability), or vice versa, demonstrating very little interpersonal trust while acting in a compliant

fashion. In such a case, the manager may decide to develop a productive means for supervising such a person.

Independence and Manageability Scales
People who are self-reliant, autonomous, self-sufficient, and who show a willingness to reach their goals by means of their own choosing are less inclined to accept strictures and protocols than people who require structure and guidance to accomplish their objectives. This is an inverse relationship. Higher scores on one scale have a tendency to correspond to lower scores on the other scale.

Individuals whose Independence and Manageability scores are not positively related demonstrate a unique synthesis of these two traits. Respondents with high Independence and Manageability scores are likely to have problems following procedures and protocol. They are self-directed, determined, and less inclined to adopt the view of others. They set their own goals and methods while adhering to the rules. Individuals who are not particularly Independent while achieving low scores in Manageability may require structure from a manager. They tend to balk when guidance is too controlling and rigid. They appreciate guidance that is neither heavy-handed nor controlling.

Validation of the Distortion Scale

Scores on the PXT Distortion Scale provide a method for determining a respondent's level of disclosure and

the veracity of his or her overall scale scores. Analysis consists of reviewing individual item response rates for the entire population to show that the majority of subjects respond to an item in a specific way, thereby making the alternative responses highly uncommon. If the respondent's responses on this scale are atypical, this unusual response style may be present throughout the assessment.

The items for the Distortion scale were selected from an original list of 35 yes/no questions selected by experienced psychologists as potentially answerable with the same response by a majority of the adult population. These 35 items were administered to a random sample of 235 adults drawn from the working population of the United States. From these results ten items were selected that had a response rate at or above 95% yes or no.

Table 3.16 is a frequency distribution of Distortion raw scores for the total norming sample.

Table 3.16

Distribution of Distortion Scale Raw Scores (N=367,259)

# of Loading Responses	Frequency	Percent	Cumulative Percent
0	4,030	1.1	1.1
1	5,260	1.4	2.5
2	7,155	1.9	4.4
3	9,482	2.5	6.9
4	13,352	3.5	10.4
5	18,665	4.9	15.3
6	18,590	7.6	22.9
7	48,603	12.9	35.8
8	93,928	24.9	60.7
9	148,194	39.3	100.0

According to Table 3.16, 39.3% of the total sample did not respond to any of the ten Distortion questions in a positive fashion (a loading response). About 25% of the total sample responded in the scored direction to one of the questions. Finally, 92% of the total sample had only two or fewer atypical Distortion responses. These findings support the rationale for the use of the questions in this scale.

When reported in the ProfileXT® reports, the Distortion scale has a negative loading. For example, a raw score of 0 (zero) yields a Distortion scale score of 10 (ten). Only a low Distortion scale score points to possible disclosure issues. See the *PXT User's Guide* for details on interpretation.

To determine the validity of individual items in the Distortion scale, response rates are analyzed across the norm population. Unlike the normally distributed item response rates of the Behavioral Traits scales, selection rates of the Distortion scale questions should be relatively low for each item to be considered a valid component.

The same sample of 367,259 working adults is studied for their Distortion item response rates. Table 3.17 illustrates the response rates and demonstrates how each individual item may be considered a valid component of the scale.

Table 3.17

Distribution of Distortion Item Response Rates (N=377,259)

Item[a]	Response[b]	Frequency	Percent
1	Loading	12,4951	33.1%
	Non-loading	252,308	66.9%
2	Loading	59,349	15.7%
	Non-loading	317,910	84.3%
3	Loading	86,544	22.9%
	Non-loading	290,715	77.1%
4	Loading	21,432	5.7%
	Non-loading	355,827	94.3%
5	Loading	34,079	9.0%
	Non-loading	343,180	91.0%
6	Loading	51,050	13.5%
	Non-loading	326,209	86.5%
7	Loading	73,111	19.4%
	Non-loading	304,148	80.6%
8	Non-loading	377,259	100.0%
9	Loading	27,637	7.3%
	Non-loading	349,622	92.7%
10	Loading	125,498	33.3%
	Non-loading	25,1761	66.7%

[a]actual item numbers in the test booklet not revealed.

[b]loading responses are those that are not considered representative of an open level of disclosure; non-loading responses are those that represent a more candid level of disclosure.

Interests

Descriptive Statistics

The administration of the ProfileXT® Interests inventory exceeds more than 300,000 individuals from various work, educational, and job-seeking environments. This large, normative sample consists of a cross-section of age, gender, ethnicity, occupations, and education level. Table 3.18 contains the mean raw scale scores, standard deviations, standard error of measurement, and score range. The six PXT Interests scales are Enterprising, Financial/Administrative, People Service, Technical, Mechanical, and Creative.

Table 3.18

ProfileXT® Interests Raw Score Descriptive Statistics (N=377,259)

Interest Scales	Mean	Standard Error	Standard Deviation	Min.	Max.
Enterprising	19.48	0.015	8.93	0	42
Financial/ Administrative	16.51	0.013	7.93	0	45
People Service	22.02	0.012	7.49	0	39
Technical	11.51	0.011	6.89	0	42
Mechanical	11.39	0.014	8.48	0	45
Creative	10.14	0.012	7.45	0	45

Coefficient Alpha Reliability Analysis

Table 3.19 contains coefficient alpha correlations for the six Interest scales.

Table 3.19

ProfileXT® Interests Coefficient Alpha Reliabilities (N=377,259)

Interest Scale	Coefficient Alpha
Enterprising	0.79
Financial/Administrative	0.72
People Service	0.73
Technical	0.71
Mechanical	0.80
Creative	0.76
Mean	0.75

These analyses indicate that the PXT Interests scales are reliable measures of occupational interests.

Test-retest Reliability

From the Hamilton and Shaw (2008) study, the following results were reported for the Interest scales. Table 3.20 displays the employee demographics. The time between the two administrations of the PXT was six to seven weeks with an average of 6.7 weeks. Table 3.21 contains the correlation results for each scale.

Table 3.20

ProfileXT® Test-Retest Sample Demographic Distribution (N=83)

Gender	Percent
Male	48.2
Female	51.8
Ethnicity	
White	83.2
Black	6.0
Hispanic	7.2
Other	3.6
Educational Level	
Didn't Graduate H.S.	6.0
High School Grad.	16.9
Some College	39.8
Assoc. Arts Degree	15.6
College Degree	39.8

Table 3.21

ProfileXT Test-Retest Study Results (N=83)

ProfileXT Scales	Test-retest Correlation
Interests	**.73**
Enterprising	.77
Financial/Administrative	.76
People Service	.69
Technical	.67
Mechanical	.78
Creative	.70

These results show scale scores are stable over time with a mean correlation of 0.73.

The study from the United Kingdom yields similar results. Table 3.22 contains the test-retest correlation estimates for the Interest scales.

Table 3.22

ProfileXT® Test-Retest Study Results[1] (N=108)

ProfileXT Scales	Test-retest Correlation
Interests	**.78**
Enterprising	.82
Financial/Administrative	.72
People Service	.90
Technical	.72
Mechanical	.73
Creative	.79

[1] United Kingdom sample

These results reinforce the temporal stability of the PXT Interest scales.

Construct Validity

Intercorrelation of PXT Scales

The PXT Interests section measures six primary dimensions of work-related and non-vocational activities. Table 3.23 contains the intercorrelations using a sample of 377,259 respondents.

Table 3.23

ProfileXT® Interests Intercorrelation Matrix (N=377,259)

	ENT	FIN	PEO	TEC	MEC	CRE
Enterprising (ENT)						
Financial/ Administrative (FIN)	.049					
People Service (PEO)	.482	.200				
Technical (TEC)	-.100	.440	-.081			
Mechanical (MEC)	-.101	-.167	-.152	.137		
Creative (CRE)	.060	.034	.315	-.185	-.187	

Table 3.23 shows the positive correlation coefficients range from .482 for the Enterprising with People Service to .034 for the Enterprising with Financial/ Administrative scales.

The results suggest that the six scales possess little common variance and that each scale measures a different occupational interest area. Thus, the six Interests scales are sufficiently independent. As predicted, the greatest commonality exists between Financial/Administrative and Technical, Enterprising and People Service, and People Service and Creative. These commonalities likely come from similar work experiences between these Interests themes. Enterprising and People Service are people-oriented themes, but respondents with high scores on either of these scales differ in their approach and intent for such interaction. Financial and Technical are both data-oriented, but differ in how data are used. Finally, People Service and Creative are more about

feelings and expressions, but differ in the undertaking. Understandably, these Interests themes are present in many of the Performance Models.

Correlation Matrix of the Six Occupational Scales: PXT and SDS

To inspect the construct validity of the Interest constructs of the PXT Interest scales, the scores on the PXT and the Self-Directed Search (Holland, 1994) are correlated. As mentioned, the format and item structure of the PXT differs from other interest inventories including the SDS. The constructs of the PXT and the SDS, however, are related. The correlations show (see Table 3.24) the two inventories measure the same six constructs.

Table 3.24

ProfileXT® and Self-Directed Search Correlations (N=190)

ProfileXT Scales	SDS Scales	Correlation Coefficient
Enterprising	Enterprising	.43*
Financial/ Administrative	Conventional	.50*
People Service	Social	.44*
Technical	Investigative	.51*
Mechanical	Realistic	.65*
Creative	Artistic	.61*

*significance level <.01.

The results demonstrate the PXT Interests section is closely related to the constructs of the SDS. Some inverse relationships exist. For instance, when the PXT Mechanical scale yields a high score for an individual, you may find their Social score for the SDS is low. This demonstrates some of the tendencies for the general population to express what interests them and what, in many cases, is not attractive at all.

Occupational Group Trends

Different occupational groups are known to have unique occupational interest patterns. The trends in interests shown by the following analyses are consistent with how the scales have been defined.

Table 3.25 contains the distribution of high point profiles for these two groups of applicants. The high point profile is the single interest scale upon which the person scores highest. The figures in the table show the percent of the respondents whose highest scores are on the respective scale.

Table 3.25

ProfileXT® Interest Scales - Sales and Construction Applicants High Point Profile

	Sales Applicants	Construction Applicants
	N=99	*N=74*
Mechanical	0%	51%
Technical	4%	6%
People Service	12%	10%
Financial/Administrative	0%	2%
Enterprising	72%	23%
Creative	12%	8%

According to Table 3.25, 72% of the sales applicants had an Enterprising high point profile, whereas 51% of the construction applicants had a Mechanical high point profile. These findings indicated the scores on the Interest scales categorized job applicants in ways that were compatible with the scales' meaning.

Table 3.26 contains the high point profile for the combined group of Chief Accountants and Accounting Managers (N=73) and a separate group of 57 Division Controllers from the same organization.

Table 3.26

PXT Interests Scales - Chief Accountants, Accounting Managers, and Controllers High Point Profile

	Chief Accountants/ Accounting Managers	Controllers
	N=73	*N=57*
Mechanical	14%	4%
Technical	14%	17%
People Service	5%	4%
Financial/Administrative	44%	52%
Enterprising	19%	23%
Creative	4%	0%

Table 3.26 indicates the Interests scales produced results that are consistent with the scale meanings. A Financial/Administrative high point profile is evident for both groups of employees. Analysis of the Interest scales scores for a large national multi-family property development and management company also supported the scale definitions. Interests inventory scales differentiated among Leasing Consultants, Property Maintenance Supervisors, and Project Manager/Construction Superintendent applicants.

In Table 3.27, data were combined for the Maintenance Supervisors and Project Managers/Construction Superintendents based on the similarity of their Interests scores.

Table 3.27

PXT Interest Scales - Leasing Consultants, Maintenance Supervisors, and Project Managers/Construction Superintendents High Point Profile

	Leasing Consultants	Maintenance Supervisors & Project Managers/Construction Superintendents
	N=65	*N=67*
Mechanical	3%	54%
Technical	7%	10%
People Service	10%	11%
Financial/Administrative	14%	5%
Enterprising	53%	17%
Creative	13%	3%

Once again, the high point profile differs for these two distinct occupational groups. These findings are further evidence that the Interest scales are related to the activities involved in different types of jobs. The findings are consistent with the results for other occupational groups assessed with the Interest Inventory.

Table 3.28 contains the high point profile for Sales and Sales Managers and Service and Body Shop Manager applicants.

Table 3.28

PXT Interest Scales - Sales, Sales Managers, and Service/Body Shop Managers High Point Profile

	Sales	Sales Managers	Service/Body Shop Managers
	N=405	*N=260*	*N=175*
Mechanical	4%	8%	36%
Technical	3%	2%	5%
People Service	7%	6%	7%
Financial/Administrative	4%	2%	9%
Enterprising	73%	72%	33%
Creative	9%	12%	10%

Table 3.28 indicates more than 70% of the Sales and Sales Manager applicants had an Enterprising high point profile compared with 33% of the Service and Body Shop Manager applicants; 36% of the Service and Body Shop Manager applicants had a Mechanical high point profile compared with only 4% of the Sales and 8% of the Sales Manager applicants.

Cognitive (Thinking Style)

Cognitive skills and abilities are important constructs in determining a person's ability to work effectively and efficiently. The PXT measures the mathematical and verbal domains using four scales:

- Verbal Skill
- Verbal Reasoning
- Numerical Ability
- Numeric Reasoning

The Cognitive section consists of multiple-choice questions and began as the Test of General Learning (TOGL) and the Measurement of General Abilities (MGA). These assessments were developed as individually administered tests of verbal, numerical, general learning, and reasoning skills.

The original Test of General Learning (TOGL) was developed in 1988 by Dr. S.G. Howard from a large pool of items measuring numeric and verbal abilities. The item pool was reviewed by a panel of psychologists and educational specialists to determine the difficulty level and appropriateness to the work environment.

These items were administered to 325 subjects with an educational achievement level ranging from 9th grade to a graduate degree. The subject pool was aged 15-28, 58% male, 68% White, 13% Black, 18% Hispanic, and 1% other. Item analysis of these data indicated the best items by type and level of difficulty. The items were arranged in increasing difficulty with numeric and verbal items mixed together.

The resulting question set consisted of 84 items. Of these, 42 made up the Verbal Learning scale and 42 the Numerical Learning scale. Since their development, they have been used in candidate selection and career development decisions. When used with a selection and training program, the TOGL has been valuable in assessing an employee's potential for job success.

Refinement of Learning Scales

In an attempt to gain a greater understanding of the cognitive abilities of PXT respondents, the original verbal and numeric scales of the TOGL are divided into four separate sections. This change facilitates scoring, offers a more in-depth analysis, and provides more useful information for users in selecting employees who are best suited for specific jobs.

The numeric items in the TOGL fall into two categories. Items that are computational in nature are in the Numerical Ability scale, while those requiring formula set-up and multiple steps are assigned to Numeric Reasoning.

The verbal section is divided in a similar way with the original scale becoming two separate scales. Items requiring vocabulary knowledge through the identification of synonyms are now Verbal Skill, and analogy items make up Verbal Reasoning.

The new question set was administered to a group of 137 employees at three different companies. They ranged in age from 19 to 57, were 54% female, and had education levels from high school to graduate degrees. Item analysis was used to select items for use on each scale. This procedure resulted in the following distribution of the 68 items: Verbal Skill-17, Verbal Reasoning-17, Numerical Ability-17, and Numeric Reasoning-17.

The Learning Index score is a composite of each of the other four Cognitive scales. The raw scores from all four Cognitive scales (all 68 questions) are combined to create a Learning Index raw score. The Learning Index serves as the fifth, independent score.

Descriptive Statistics

The Cognitive section of the PXT assesses the thinking abilities of applicants and incumbents. Table 3.29 shows the descriptive statistics for the Cognitive section scales.

Table 3.29

ProfileXT® Cognitive Raw Score Descriptive Statistics (N=377,259)

Thinking Style Scales	Mean	Standard Error	Standard Deviation	Min.	Max.
Verbal Skill	13.17	0.006	3.41	0	17
Verbal Reasoning	10.87	0.006	3.67	0	17
Numerical Ability	12.85	0.006	3.76	0	17
Numeric Reasoning	11.46	0.006	3.72	0	17

Coefficient Alpha Reliability Analysis

The reliability of each of the four scales in the Cognitive section was computed using the standard coefficient alpha method. These analyses were performed using a sample size of 377,259 respondents.

Table 3.30

ProfileXT® Cognitive Coefficient Alpha Reliability (N=377,259)

Thinking Style Scale	Coefficient Alpha
Verbal Skill	0.81
Verbal Reasoning	0.79
Numerical Ability	0.85
Numeric Reasoning	0.82
Mean	0.84

In Table 3.30, reliabilities are from .79 for the Verbal Reasoning scale to .85 for the Numerical Ability scale. The average reliability for the four cognitive ability scales is .82. These reliability estimates suggest the Verbal and Numerical scales are reliable and produce consistent results.

Test-retest Reliability

The results of the test-retest study (Hamilton & Shaw, 2008) for the PXT Cognitive scales are shown in Tables 3.31 through 3.33.

Table 3.31

ProfileXT® Test-Retest Sample Demographic Distribution (N=83)

Gender	Percent
Male	48.2
Female	51.8
Ethnicity	
White	83.2
Black	6.0
Hispanic	7.2
Other	3.6
Educational Level	
Didn't Graduate H.S.	6.0
High School Grad.	16.9
Some College	39.8
Assoc. Arts Degree	15.6
College Degree	39.8

Table 3.32

ProfileXT Test-Retest Study Results (N=83)

ProfileXT Scales	Test-retest Correlation
Cognitive	**.75**
Verbal Skill	.74
Verbal Reasoning	.66
Numerical Ability	.78
Numeric Reasoning	.80

These results show scale scores are stable over time, with a mean correlation of 0.75. Study results for the Great Britain sample are shown in Table 3.33.

Table 3.33

ProfileXT® Test-Retest Study Results[1] (N=108)

ProfileXT Scales	Test-retest Correlation
Thinking Style	**.82**
Verbal Skill	.74
Verbal Reasoning	.93
Numerical Ability	.78
Numeric Reasoning	.81

[1]United Kingdom sample

These results reinforce the temporal stability of the PXT Cognitive scales.

Validity

Construct Validity

To establish the constructs in the Thinking Style section of the PXT as valid measures of cognitive ability, the scores from the PXT were compared to those on the SAT (Scholastic Aptitude Test) for a group of entering freshmen at a private university in Texas. The description of the sample used in this analysis is shown in Table 3.34.

Table 3.34

ProfileXT® by SAT Sample Demographics (N=284)

Gender	Percent
Male	48.2
Female	51.8
Ethnicity	
White	53.5%
Black	15.1%
Hispanic	21.8%
Other	9.6%

Each subject in the sample was administered the ProfileXT as part of the entering freshman orientation program at the university. The scores achieved on the Thinking Style section of the PXT were then analyzed to determine the relationship to the SAT scores of the subjects. Table 3.35 shows the results of this analysis.

Table 3.35

ProfileXT® Learning Style by SAT Score Correlations

		SAT Verbal	SAT Math	SAT Composite
Learning Index	Pearson Correlation	.386	.547	.526
	Sig. (2-tailed)	.000	.000	.000
Verbal Skill	Pearson Correlation	.289	.276	.319
	Sig. (2-tailed)	.000	.000	.000
Verbal Reasoning	Pearson Correlation	.489	.408	.508
	Sig. (2-tailed)	.000	.000	.000
Numerical Ability	Pearson Correlation	.169	.424	.333
	Sig. (2-tailed)	.004	.000	.000
Numeric Reasoning	Pearson Correlation	.222	.478	.394
	Sig. (2-tailed)	.000	.000	.000

All correlations significant at the 0.01 level (2-tailed).

Table 3.35 indicates all correlations are significant at the .001 level (2-tailed). The strongest correlations for individual scales are between the SAT Verbal and PXT Verbal Reasoning scores and the SAT Math and PXT Numeric Reasoning scores. It is important to note, however, that the composite scales, SAT Composite and PXT Learning Index, show a very strong correlation at .526, indicating a large effect size (Cohen, 1988). This analysis shows that the relationship between the ProfileXT® Thinking Style scales and those of the long-established SAT are consistent with good construct validity.

Criterion-related Validity

Since 1988, this instrument has been used for pre-employment selection and career counseling. Content and concurrent validity methodologies have been used to study the meaningfulness of inferences drawn from the Thinking Style section of the PXT. Over 3,200 respondents across 110 job titles and 15 industries have participated in 52 validity studies. The samples are ethnically mixed, ranging in age from 17 to 68. The TOGL has been established as a useful instrument for predicting job performance in a number of occupational settings.

These studies were completed in work settings that had specific learning and training needs. Employers wanted to know how a person would respond to a new learning situation, what areas might prove to be strengths or weaknesses, and what could be done to overcome any deficits. The assessment was designed to answer these

questions and to recommend approaches. For example, a new supervisor in a bank might require extra time and feedback-style learning to grasp written materials, whereas his or her numerical abilities would be suited for the entry-level job. In other cases, employers asked, "What are the learning characteristics of our best performers versus our weakest performers?" In answering this question, the Cognitive questions were an invaluable part of assessing group performance versus individual results. This led to the ability of the employer to gear broad training toward new hires.

The correlation between job performance and scores on the Cognitive portion of the assessment showed a positive relationship between learning characteristics and performance. Table 3.36 displays the correlation coefficients between scores and job performance across occupations.

Table 3.36

Correlations of Test Scores and Job Performance Grouped by Occupational Title

Occupational Title	Verbal	Numerical	Total	N
Senior-Level Managers	.54	.32	.44	275
Mid-Level Managers	.34	.28	.29	430
Branch Managers	.41	.26	.37	112
Retail Store Managers	.42	.27	.29	80
Shift Supervisors	.29	.28	.28	110
Teller Supervisors	.33	.34	.33	55
Sales Representatives	.45	.25	.36	655
Customer Service Rep.	.37	.22	.30	255
New Accounts Managers	.29	.31	.30	90
Executive Secretaries	.43	.32	.38	37
Auditors	.14	.35	.25	29
Engineers	.13	.42	.28	37
Programmer Analysts	.22	.34	.28	42
Programmers	.27	.36	.33	65
Computer Operators	.31	.29	.30	35
Sales Coordinators	.35	.22	.29	59
Order Desk Clerks	.25	.29	.27	52
Administrative Assistants	.13	.18	.15	31
Clerk – Level I	.25	.21	.23	34
Bank Tellers	.11	.24	.15	96
AR/AP Clerks	.27	.31	.29	421
Total	.36	.23	.30	2,540

Note: All reported results are significant at the .05 level or better.

These results indicate that scores themselves do not necessarily correlate strongly with good job

performance, and they help explain the need for the Performance Model. While some jobs require high cognitive abilities, others do not and, in fact, a person with higher abilities than are needed for a job may not perform well in that job. The Performance Model corrects for this range of job requirements by identifying the precise level of cognitive ability (as well as other traits) most associated with performance in a given job. In short, the relationship between scores on any scale and job performance is only evident in the context of the Performance Model. The true relationship is between how well the individual's traits fit the job itself, based on the characteristics of others who have been successful in that job.

Another way to provide validity evidence is by analyzing the relationship between test performance and performance on another measure. The correlation between PXT verbal and numeric scores was calculated, resulting in a moderate correlation (see Table 3.37). This indicates that the scores are related but not redundant, which is to be expected since the constructs are academic subjects but assess different skills and abilities.

Table 3.37

ProfileXT® Cognitive Scale Intercorrelation Matrix (N=377,259)

	VS	VR	NA	NR
Verbal Skill (VS)				
Verbal Reasoning (VR)	.597			
Numerical Ability (NA)	.477	.532		
Numeric Reasoning (NR)	.506	.628	.647	

Validity of the PXT Job Match Percent

The meaningfulness of the PXT depends on its inferences to predict which individuals will perform well in a given job. The PXT distinguishes between those who are high performers and those who are not. Studies are conducted in which the client identifies top and bottom performers and then compares their PXT results (Job Match Percents) to actual performance measures. The details of two studies of current employees are presented here as examples (consult Table 3.38).

In the first study, Claim Adjudicators of a Midwestern governmental agency (N=35) were assessed with the PXT and their job performance evaluated. The supervisory staff developed a Performance Model based on the characteristics that separated top and bottom performing employees.

The average amount of time required to process claims and the overall quality of work were the criteria for measuring job performance. The quality score was on a 10-point scale and the time variable was converted to a STEN scale. These two scores were standardized and then averaged to provide an overall performance score for each employee.

All 35 employees' PXT results were matched against the Performance Model, and the resulting Overall Job Match Percent (OJMP) was compared to their performance scores. The correlation between employee performance score and PXT Job Match Percent was 0.40, indicating a significant relationship at $p<.05$. Based

on the work of Cohen (1988), this result produces a large effect size.

Another study was conducted using enrollment advisors for a nationwide online higher education institution. The advisors (N=64) were administered the PXT, and supervisors rated their performance using the ratio of the number of contacts that resulted in student enrollment.

A Performance Model was developed to identify the PXT traits that differed between advisors who excelled at their jobs and those who did not. The OJMPs for the existing advisors were calculated against this pattern and correlated to their performance ratios. The resulting correlation coefficient was 0.41 and was also significant at the $p<.05$ level. In addition, the effect size was also large.

Table 3.38

ProfileXT® Overall Job Match Percent Correlation to Job Performance

Study Group	N	Mean Performance	Standard Deviation	Mean OJMP	Standard Deviation	R	R^2	p
Govt. Agency	35	6.92	1.04	84.76	8.54	.402	**.162**	.000
Higher Ed.	64	7.53	1.10	82.43	9.38	.413	**.171**	.000

The results of these studies provide evidence of the utility of the PXT in identifying top performing employees. A common feature of these and other studies is the relatively small sample size and thus the importance of analyzing these and other studies meta-analytically.

Meta-analytic Study

A meta-analysis is a procedure for synthesizing the findings of multiple research projects on the same topic (Vogt, 2005). This technique is useful when calculating outcomes for small sample sizes that lack the statistical power to produce significant findings. The samples are pooled, thus creating a larger sample. The larger the sample, the greater the confidence is in the results.

The data for the meta-analysis were case studies provided by the Wiley Client Services Division. Studies were selected for inclusion if the data were sufficient to calculate an effect size. In each of these case studies, the participants' performance was rated by the client, and they were administered the ProfileXT® assessment. An individual model for each job position was built using actual performance results and relevant job performance measures (for more information, consult "Building Performance Models" in Chapter 2). The correlation between the Overall Job Match Percents of the top and bottom performers, and their performance rating, was then calculated. Using the Hunter and Schmidt Method (Hunter & Schmidt, 2004), the correlations of each individual study were weighted

by the sample size, summed, and then divided by the number of participants across all samples. Results for each study in the meta-analysis are contained in Table 3.39.

Table 3.39

ProfileXT® Overall Job Percent Match Meta-Analysis Study Data

Study	*N*	r	*N* x r
Study 1	11	0.522	5.742
Study 2	8	0.267	2.135
Study 3	5	1.000	5.000
Study 4	34	0.532	18.292
Study 5	10	0.620	6.200
Study 6	19	0.307	5.833
Study 7	16	0.425	6.800
Study 8	11	0.652	7.172
Study 9	19	0.297	5.643
Study 10	19	0.194	3.686
Study 11	7	0.759	5.313
Study 12	7	0.405	2.835
Study 13	64	0.413	26.432
Study 14	35	0.402	14.070
Study 15	43	0.400	17.200
Study 16	48	0.401	19.248
Total	356		151.602

Dividing the summed, weighted value (151.602) by the total sample size (N=356) quotient reveals a 0.426 correlation coefficient. This value indicates a positive, moderately strong relationship between the measured

Overall Job Match Percent and the Performance rating assigned by the candidate's organization.

The next step is to calculate confidence intervals by adding or subtracting the square root of the estimated population variance multiplied by 1.96 (to provide a 95% interval) from the true study effect of .426.

- 95% Confidence Interval upper = .535
- 95% Confidence Interval lower = .377

Based on this analysis, the Overall Job Match Percents acquired from this sample of 16 studies and 356 job candidates indicate good utility of the PXT in identifying individuals who excel according to the client's performance criteria.

Meta-analysis of the relationship between job performance and Job Match Percent for each individual domain in these studies showed similar results. Table 3.40 shows the correlation coefficient for each of the three PXT domains.

Table 3.40

ProfileXT® Job Match Percent Meta-Analysis by Domain

PXT Domain	r	r^2
Behavior	.466	.217
Interest	.365	.133
Cognitive	.535	.286

These results demonstrate the meaningfulness of inferences drawn from PXT's test scores.

Adverse Impact

Achieving fairness in job selection is an important objective. The U.S. Department of Labor provides guidelines that suggest important considerations for using tests in the selection process. A common concern throughout the guidelines is that the instruments used should be appropriate and that protected groups are treated fairly.

In the ProfileXT®, the critical value in the decision-making procedure is the Job Match Percent. There are four such values used in the ProfileXT: Thinking Style, Interests, Behavioral Traits, and Overall Job Match Percents. Decision-makers may reference these percentages as an estimation of the respondent's potential in the job. If these percentages adversely impact individuals, then the assessment is doing both the decision maker and the respondent a disservice.

A study was conducted to demonstrate the effectiveness of the Job Match Percents and their Performance Models to avoid adverse impact. The sample included over 900,000 comparisons of actual ProfileXT® scores to Performance Models in the workplace. This sample included ethnicity, age, and gender groups selected from job matching cases in a variety of industrial and corporate settings.

In each case, a candidate was matched to a Performance Model specifically designed for the job(s) the applicant was seeking. Self-selection for each job was inherent for each case. Members chose the

model to which they were to be matched by becoming actual applicants for those jobs. The models had been validated by the organizations using them through concurrent studies of incumbents. Approximately 200,000 Performance Models were included in the study. In every case, each respondent was assumed to be reasonably qualified for the job and its Performance Model.

Differences in Job Match Percentages between ethnic, gender, and age groups were typically one or two percentiles on average, which does not negatively influence an individual's selection potential. Table 3.41 shows the results of the comparison of Job Match Percents by ethnicity.

Table 3.41

Distribution of Overall Job Match Percents by Ethnicity (N=290,023)

Ethnicity	N*	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
American Indian or Alaskan Native	2,020	75.486	11.0946	0.2469	75.002	75.970
Other	9,718	75.482	11.0212	0.1118	75.263	75.701
Asian or Pacific Islander	14,470	75.949	10.1931	0.0847	75.783	76.115
Hispanic	40,544	74.381	11.4658	0.0569	74.269	74.492
Black, not of Hispanic origin	44,527	75.581	11.0604	0.0524	75.478	75.684
White, not of Hispanic origin	178,744	76.809	10.2662	0.0243	76.762	76.857

*N represents the total number of times PXT results were matched to patterns for different jobs. PXT results for an individual may be matched to multiple patterns.

Statistical details concerning this study, as well as other adverse impact analyses, may be found in Appendices B and C. While the omnibus results indicate no adverse impact, users are encouraged to monitor the fairness of the PXT process as part of their overall local hiring and placement system.

Summary and Conclusions

The results of the analyses of internal and external validity indicate the PXT is a valid assessment for use in determining person-job fit.

This chapter summarizes the results of PXT's validation studies. The results of the research support the validity of the PXT assessment. Correlation studies between PXT scale scores and measures of sales success, management performance, customer service, conscientiousness, turnover, and organizational status are relevant and statistically significant. These findings support the validity of the PXT when job performance is the criterion.

Statistical analyses indicate the PXT job matching process provides an accurate measure of nine dimensions of "normal" adult personality that are useful for predicting a number of important business-related criteria without adversely impacting members of protected groups.

The data support the fact that the ProfileXT® Interests Inventory measures six general themes of interests based upon preferences for commonly known activities.

The test generates similar results compared to other tests, while measuring interests in a unique way.

Cognitive ability test scores and job performance criteria are related across different positions and work settings. When combined with behavior and interest measures, the cognitive domain of the PXT shows a strong correlation to job performance and supports the importance of assessing this construct.

By using Performance Models developed with either top performers (concurrent study method) or with those who know the job well through job analysis techniques, the ProfileXT® presents representative models for matching. The overall match to those models considers information about an individual's fit in Thinking Style, Interests, and Behavioral Traits. This makes the impact of any one scale small, and it guards against the introduction of disparate impact into the placement process.

Appendix A: Review of the ProfileXT® Scales

Behavioral Traits

Behavioral Traits define who we are, how we interact with others, and how we approach work. The ProfileXT® assesses traits shown to be important in business settings. A brief description of each behavioral trait is provided.

Accommodating is associated with a concern for group accountability and a willingness to consider the needs of group members.

High Scores

- Cooperative
- Wants to make a good impression
- Harmonious
- Likeable

Low Scores

- Firm and direct
- Willing to disagree
- Unlikely to appease others

Assertiveness is a general sense of confidence and an inclination to impose one's viewpoint on others.

High Scores

- Expressive
- Achievement oriented
- Sense of leadership

Low Scores

- Accepting
- A follower rather than a leader
- Low dominance
- Avoids conflict

Attitude measures the degree to which one trusts others. It relates to the tendency to suspend judgments about people and outcomes.

High Scores

- Optimistic
- Trusting
- Relaxed
- Affirmative

Low Scores

- Skeptical
- Critical
- Vigilant for negative outcomes
- Questioning

Energy Level demonstrates a tendency toward restlessness, activity, and drive.

High Scores

- Self-starter
- Multi-tasker
- Vibrant
- Self-motivated

Low Scores

- Patient
- Methodical

- Focused
- One thing at a time

Independence defines the manner in which an individual prefers to be directed by others and one's potential to accomplish tasks with minimal supervision.

High Scores

- Adventurous, self-sufficient
- Avoids forced structure from superiors
- Likes to set personal direction

Low Scores

- Seeks support and reinforcement
- Open to having work evaluated
- Accepts supervisory structure

Objective Judgment relies more on logic and reasoning than intuition. This is often referred to as the balance between "head" and "gut."

High Scores

- Uses a logical approach
- Unemotional thinking
- Objective and indifferent

Low Scores

- Subjective
- Follows a "gut" feeling
- Intuitive reasoning

Sociability is a measure of one's reliance on interpersonal contacts and on work that involves group-oriented endeavors.

High Scores

- Seeks interpersonal contact
- Motivated by teamwork
- Group oriented

Low Scores

- Distracted by social interruptions
- Sticks to business
- Avoids small talk
- Comfortable working alone

Manageability is the tendency to be socially responsible. It is a measure of how one reacts to the limits placed by authority and one's acceptance of conventional opinion.

High Scores

- Cooperative and agreeable
- Works within the rules
- Comfortable with authority

Low Scores

- Can be cautious with authority figures
- Tends to defend point of view
- Willing to question authority when not in agreement

Decisiveness reflects how confident one is in making decisions in a timely fashion.

High Scores

- Quick to act
- Accepts the risks in most situations
- Accepts the limited information available for

making decisions
- Does not feel the need to gather more information than time allows

Low Scores
- Rarely impulsive
- Makes deliberate, careful decisions
- Tends to pursue problems methodically, taking little risk
- Prefers to carefully analyze the situation before making a decision

Interests

Six Interest areas are used to predict motivation and satisfaction across job positions. Each interest area defines characteristics that identify the aspects of the work environment. Holland's (1985) theoretical framework provides the basis for the development and interpretation of these Interests themes.

Enterprising indicates an interest in occupations where one uses persuasion and presentation skills; the entrepreneurial aspects of sales and business appeal to such individuals.

Characterized by interest in:
- Entrepreneurial pursuits
- Profit-oriented activities
- Leading projects
- Persuading others

Representative occupations sharing this interest include management consultants, sales representatives, entrepreneurs, business owners, and inventors.

Financial/Administrative indicates interest in occupations that work with financial data, business systems, and administrative procedures.

Characterized by interest in:

- Financial tasks
- Administrative organization
- Office work
- Business procedures

Representative occupations include bankers, attorneys, historians, journalists, economists, administrative managers, and factory managers.

The **People Service** scale indicates interest in occupations that help people and are concerned with the welfare of others.

Characterized by interest in:

- Facilitation
- Helping others
- Social awareness

Representative occupations include social workers, psychologists, social welfare directors, physicians, labor relations managers, employment managers, HR professionals, and college professors.

The **Technical** scale indicates interest in occupations that center on scientific and technical activities, research, and intellectual skills.

Characterized by interest in:

- Intellectual approaches
- Scientific study
- Research methods

Representative occupations include physicists, mathematicians, statisticians, engineers, computer programmers, and research analysts.

The **Mechanical** scale indicates interest in occupations that involve hands-on work, using equipment, and machinery and physical vocations.

Characterized by interest in:

- Working with machines, tools, and equipment
- Work associated with the outdoors and/or being physical
- Activities associated more with hands-on tasks than with people

Representative occupations include production managers, heavy equipment operators, forest rangers, engineers, and farmers.

The **Creative** scale indicates interest in occupations where one may be imaginative, original, and aesthetic.

Characterized by interest in:

- Art and aesthetics
- Creative expression

- Imagination and originality
- Innovative concepts

Representative occupations include artists, writers and journalists, PR consultants, chefs, and advertisers.

Thinking Style Scales

A primary resource for learning is the ability to process information coming from the environment. In most training situations the information is in the form of words or numbers. Each of the four Thinking Style sub-sections measures an aspect of understanding words or numbers and using each as a part of the reasoning process. They form the foundation for problem solving, communication, interaction, and learning skills that are used on the job.

The Learning Index score in the Thinking Style section is a composite of four sub-scales: Verbal Skill, Verbal Reasoning, Numerical Ability, and Numeric Reasoning. It is an index of expected learning, reasoning, and problem-solving ability.

Typically, the more easily an individual processes information, the greater the pace at which they may learn skills used on the job. Maximizing learning means finding the approach that makes the most of a candidate's learning skills.

> **Learning Index** – an index of expected learning, reasoning, and problem-solving potential; a composite of four scales: Verbal Skill, Verbal

Reasoning, Numerical Ability, and Numeric Reasoning

Verbal Skill – a measure of verbal skill through vocabulary

Verbal Reasoning – using words as a basis in problem solving and other forms of analytical thought

Numerical Ability – a measure of numeric calculation ability

Numeric Reasoning – using numbers as the basis in analysis of numerical information

The Distortion Flag

The Distortion scale evaluates the consistency of the individual's responses on the assessment. Inconsistent or unusual responses are flagged on the report for distortion. A flagged report indicates that the results may not be representative of the individual.

The Distortion scale refers to the usability of the results, not the honesty of the person. Reports that are flagged can reflect several possible situations. For example, difficulty in reading the questions, an attempt to portray a picture of how they would like to be seen—rather than an accurate picture of who they are, a very casual and inconsistent approach to answering the questions, etc. However, the distortion flag should not be used as a basis for disqualification of an individual.

When distortion is flagged, the following cautionary statement will appear on the reports:

"The Distortion scale for this assessment suggests the results may not be useful in making a decision. Please consult the User's Guide for this product for further guidance."

Appendix B: Adverse Impact and the Rule of 4/5ths

Utilization of Performance Models: Effect upon Adverse Impact Issues

The ProfileXT® uses a Performance Model to determine the fit of a candidate to a particular job. A Performance Model reflects the characteristics of those who have proven to be effective in a given job. This job matching process contributes to the overall fairness of the selection tool, while maintaining good utility in defining how well an individual matches a particular position. Discussion of the development of the ProfileXT Performance Model can be found in Chapter 2 of the *Technical Manual*. Each Performance Model is the combination of the characteristics (traits, interests, and abilities) common to those who perform well in that particular job. The question then becomes, "Does the job matching process contribute to adverse impact against minority groups?"

To investigate this question, a sample of 295 individuals was collected randomly from the pool of over 5,000 business users of the online ProfileXT. To maintain the same level of diversity present in a normal population of candidates, proportionate random sampling was conducted. White candidates, for example, were randomly chosen until the subgroup of this sample represented a proportionate level when compared to national demographic statistics. This was done for each

of the ethnic groups studied. The composition of the sample can be found in Table B.1.

Table B.1

Size of Sample Groups by Ethnicity

N=295	Asian	Black	Hispanic	White
Sample Size	14 (5%)	38 (13%)	36 (12%)	207 (70%)

Three Performance Models were selected to compare with each subject's test results. The models selected were Customer Service Representative, Human Resource Manager, and Administrative Assistant. They were selected because they represented different levels in an organization and were commonly found in the client database. The premise was to compare the percent match to each model for each subject with reference to the subject's ethnicity. Both an analysis of the mean differences of percent match scores between ethnic groups and an analysis of the selection rates for each ethnic group were conducted for each model.

The results of the analysis of variance demonstrate how the Performance Model system is both inclusive and fair with reference to ethnicity. In no case did one group demonstrate significantly higher matches over another group. Table B.2 displays the actual statistical results.

Table B.2

Comparison of Means for Ethnic Groups

Analysis of Variance		*N*	Mean of % Match	Standard Deviation	Mean Difference	Significance
Administrative Assistant %	Asian	14	62.31	9.98	-.07	1.000
	Black	38	66.62	12.83	-4.39	.259
	Hispanic	36	67.12	10.24	-4.88	.191
	White	207	62.23	12.75		
	Total	295	63.40	12.48		
Customer Service %	Asian	14	63.02	12.24	5.26	.464
	Black	38	68.23	13.75	.05	1.000
	Hispanic	36	68.07	9.83	.21	1.000
	White	207	68.28	11.84		
	Total	295	68.00	12.89		
Human Resources %	Asian	14	64.75	11.36	3.49	.773
	Black	38	65.74	13.34	2.50	.704
	Hispanic	36	63.16	14.86	5.08	.140
	White	207	68.25	11.19		
	Total	295	67.14	12.06		

Note: Each minority ethnic group is compared with the majority ethnic group (White).

Following the initial analysis, the actual selection results were investigated. The process involved a Job Match Percent that determined which candidates were more concisely matched to the targeted position. In a true selection process, additional instruments may be used, but the important issue for analysis was whether the Job Match Percent, when used with the PXT, created disparate impact for minority groups.

The 4/5^{ths} rule judges the fairness of the actual process of selection. The analysis involved a simple count of individuals in our sample who demonstrated percent matches to each position sufficient for selection. The sums were calculated and then reviewed for ethnic diversity according to the 4/5^{ths} Rule of Selection Ratios.

Table B.3 shows the selected candidates by ethnicity. The utility of the 4/5^{ths} rule is demonstrated when selection rates are compared between the ethnic majority and each minority group. Two different Job Match Percents are analyzed, 70% and 80%. These represent the range frequently used by the clients in actual practice. Clients have found that setting percent match criteria can enhance the value of the selection process from an adverse impact perspective.

Table B.3

Actual Numbers Selected Compared with Numbers Predicted by the Guidelines

Job Match Percents	Asian (*N*=14)		Black (*N*=38)		Hispanic (*N*=36)		White (*N*=207)	
	ACT	PRED	ACT	PRED	ACT	PRED	Number Selected	Selection Rate
Administrative Assistant								
70%	4	3	16	8	15	7	52	25%
80%	1	1	4	2	5	2	13	6%
Customer Service Rep								
70%	5	5	21	14	17	13	98	47%
80%	2	2	6	5	4	4	32	15.40%
Human Resource Manager								
70%	5	5	16	15	14	5	101	48.20%
80%	1	1	3	3	8	3	20	9.70%

Note: ACT (actual number selected), PRED (number predicted by rule of 4/5ths)

The Rule of 4/5ths was used to derive the predicted number to be selected for each ethnic group, as shown in the PRED column of Table B.3. The actual number selected for each percent match value can be found in the ACT column. These numbers can be compared to understand their relationship. In each case, the actual number selected met or exceeded the minimum required using the rule of 4/5ths, supporting the fairness of this Performance Modeling process.

As demonstrated by this table, the selection rate for each protected ethnic group was at least 4/5ths the selection rate for the White ethnic group. This was consistent with the guidelines recommended by the regulations and suggests the Job Match Percent procedure does not contribute to disparity when used as a part of the selection process.

Subsequent Salesperson Study

A subsequent study of 260 employees identified as salespersons was conducted to investigate adverse impact for sales positions. While the Black group was represented in sufficient numbers for meaningful analysis (9.6%), Hispanics (3.4%) and Asians (2.7%) were not (refer to Table B.4).

Table B.4

Sample Ethnic Mix

Ethnic Group	Asian (*N*=7)	Black (*N*=25)	Hispanic (*N*=9)	White (*N*=219)	Total (*N*=260)
Percent of Total	2.7%	9.6%	3.5%	84.2%	100%

For this analysis, a Sales Performance Model was used. The White salespersons and the Black salespersons were matched to this model to obtain an Overall Job Match Percent for each individual. These data were analyzed to determine if the Rule of 4/5^{ths} was met for the Black salespersons. Similar to the earlier study, two levels were used in this analysis, a 70% match and then an 80% match to the model. The results of this analysis can be found in Table B.5.

Table B.5

Actual Numbers Selected Compared with Numbers Predicted by the Guidelines

Job Match Percents	Black (*N*=25)		White (*N*=219)	
	ACT	PRED	Number Selected	Selection Rate
70%	21	18	197	89%
80%	13	12	133	60%

Note: ACT (actual number selected), PRED (number predicted by rule of 4/5^{ths})

As previously discussed, the Rule of 4/5^{ths} was used to establish the predicted number to be selected for the Black group at both the 70% Job Match level and the 80% Job Match level. These numbers were shown in the

PRED column of Table B.5. The actual number for each percent match value was shown in the ACT column. The numbers can be compared to understand their relationship.

In each case, the actual number selected met or exceeded the minimum required number, thereby supporting the fairness of the Performance Modeling process. As the findings in Table B.3 and Table B.5 show, the selection rate for the protected group was at least 4/5^{ths} the selection rate for the White ethnic group. These results met the guideline requirements and suggested the Job Match Percent procedure does not contribute to disparity when used as a part of the selection process.

Appendix C: Adverse Impact and Job Match Percent

As discussed earlier, the Job Match Percent is derived by matching the respondent's score on each scale to a Performance Model of scores for a specific position. If the respondent's scores fall outside of the benchmark or model for a scale, the effect lowers his or her Job Match Percent. The farther the score falls outside of the model, the greater the negative effect on the Job Match Percent. This applies equally if they score above or below the model. Thus, those respondents with scores that closely match the model of scores defined for the position possess a higher percent match than those whose scores fall outside of the model.

In 2005, a study was conducted to review the possibility of adverse impact in the use of the Performance Modeling process. The purpose of the study was to determine if there were significant or practical differences between Overall Job Match Percents (OJMP) for members of ethnic, gender, and age subgroups.

The subjects represented individuals who were matched to Performance Models during actual use of the PXT in the United States. Each individual may have been matched against one or more models. The resulting number of matches against a model equaled 907,326. It should be noted that the same scores on the PXT scales matched against different models can lead

to different OJMP results. Several assumptions were made about these Performance Model situations:

- The applicants applied for real-life jobs and they had a reasonable fit to the positions.
- The Performance Models for the jobs in question were valid for each position in the study.
- Some applicants misjudged their fit to the position.
- Not all applicants were placed into the position for which they applied.

The statistical details are provided in this appendix. Table C.1 displays the descriptive statistics including mean OJMP, standard deviations, and standard error by ethnic group.

Table C.1

Distribution of Overall Job Match Percents by Ethnicity (N=907,326)

Ethnicity	*N**	Mean OJMP	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Asian	19,717	69.906	11.9108	0.0848	69.74	70.073
African American	39,082	71.915	11.4966	0.0582	71.801	72.029
Hispanic	22,747	72.324	11.7183	0.0777	72.171	72.476
Caucasian	825,780	69.887	12.0644	0.0133	69.861	69.913

*N represents the total number of times PXT results were matched to models for different jobs. PXT results for an individual may be matched to multiple models.

Note that the variations in mean OJMP among the various groups are nominal as to have no practical impact on job selection.

Table C.2 reveals each ethnic group's comparative analysis of mean OJMP, flagging each instance of statistically significant differences between groups. It is obvious that from a practical perspective, these differences are small.

Table C.2

ANOVA of Overall Job Match Percents by Ethnicity

Reference Group (I)	Focus Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Asian	African American	-2.0086(*)	.1051	.000	-2.302	-1.715
	Hispanic	-2.4173(*)	.1170	.000	-2.745	-2.090
	Caucasian	.0190	.0867	.997	-.223	.261
African American	Asian	2.0086(*)	.1051	.000	1.715	2.302
	Hispanic	-.4088(*)	.1003	.001	-.689	-.128
	Caucasian	2.0276(*)	.0623	.000	1.854	2.202
Hispanic	Asian	2.4173(*)	.1170	.000	2.090	2.745
	African American	.4088(*)	.1003	.001	.128	.689
	Caucasian	2.4363(*)	.0808	.000	2.210	2.662
Caucasian	Asian	-.0190	.0867	.997	-.261	.223
	African American	-2.0276(*)	.0623	.000	-2.202	-1.854
	Hispanic	-2.4363(*)	.0808	.000	-2.662	-2.210

* The mean difference is significant at the .05 level.

These findings show there is little or no practical difference between ethnic groups on OJMP. Although there is a statistically significant difference between the majority group (White) and other ethnic groups, the difference is in favor of the minority groups.

Table C.3 displays the descriptive statistics and the results of the analysis of variance by gender for the OJMP, including means, standard deviations, and standard errors.

Table C.3

Distribution/ANOVA of Job Match Percents by Gender

Gender	*N*	Overall Job Match Percent Mean	Mean Difference (M-F)	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Male	503,928	70.145	0.245(*)	12.1522	.0171	70.111	70.178
Female	403,398	69.900		11.8998	.0187	69.864	69.937

* The mean difference is significant at the .05 level.

Again, the data indicate a statistically significant difference between the OJMP of males and females, and one with no practical impact.

Table C.4 displays the descriptive statistics by age group for the OJMP including means, standard deviations, and standard errors.

Table C.4

Distribution of Job Match Percents by Age Group

Age Groups	*N*	Overall Job Match Percent Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
15-24	309,045	68.762	11.5062	.0207	68.721	68.802
25-34	181,095	71.558	12.1204	.0285	71.503	71.614
35-44	200,354	70.458	12.5303	.0280	70.403	70.513
45-54	154,615	70.472	12.0349	.0306	70.412	70.532
55-64	44,577	70.275	12.2681	.0581	70.161	70.389
65+	17,640	67.519	11.6022	.0874	67.348	67.690
Total	907,326	70.036	12.0412	.0126	70.011	70.061

Table C.5 reveals each age group's comparative analysis of mean Job Match Percents, flagging each instance of statistically significant differences between age groups. These differences are small from a practical perspective.

Table C.5

ANOVA of Job Match Percents by Age Group

Reference Age Group (I)	Focus Age Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
15-24	25-34	-2.7969(*)	.0355	.000	-2.915	-2.679
	35-44	-1.6967(*)	.0344	.000	-1.811	-1.582
	45-54	-1.7103(*)	.0374	.000	-1.835	-1.586
	55-64	-1.5134(*)	.0608	.000	-1.716	-1.311
	65+	1.2424(*)	.0928	.000	.934	1.551
25-34	15-24	2.7969(*)	.0355	.000	2.679	2.915
	35-44	1.1001(*)	.0389	.000	.971	1.230
	45-54	1.0866(*)	.0415	.000	.948	1.225
	55-64	1.2835(*)	.0634	.000	1.073	1.494
	65+	4.0393(*)	.0946	.000	3.725	4.354

* The mean difference is significant at the .05 level.

Table C.5 (continued)

ANOVA of Job Match Percents by Age Group

Reference Age Group (I)	Focus Age Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
35-44	15-24	1.6967(*)	.0344	.000	1.582	1.811
	25-34	-1.1001(*)	.0389	.000	-1.230	-.971
	45-54	-.0136	.0406	1.000	-.149	.121
	55-64	.1833	.0628	.130	-.026	.392
	65+	2.9392(*)	.0942	.000	2.626	3.252
45-54	15-24	1.7103(*)	.0374	.000	1.586	1.835
	25-34	-1.0866(*)	.0415	.000	-1.225	-.948
	35-44	.0136	.0406	1.000	-.121	.149
	55-64	.1969	.0645	.097	-.018	.411
	65+	2.9527(*)	.0953	.000	2.636	3.270

* The mean difference is significant at the .05 level.

Table C.5 (continued)

ANOVA of Job Match Percents by Age Group

Reference Age Group (I)	Focus Age Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
55-64	15-24	1.5134(*)	.0608	.000	1.311	1.716
	25-34	-1.2835(*)	.0634	.000	-1.494	-1.073
	35-44	-.1833	.0628	.130	-.392	.026
	45-54	-.1969	.0645	.097	-.411	.018
	65+	2.7558(*)	.1067	.000	2.401	3.111
65+	15-24	-1.2424(*)	.0928	.000	-1.551	-.934
	25-34	-4.0393(*)	.0946	.000	-4.354	-3.725
	35-44	-2.9392(*)	.0942	.000	-3.252	-2.626
	45-44	-2.9527(*)	.0953	.000	-3.270	-2.636
	55-64	-2.7558(*)	.1067	.000	-3.111	-2.401

* The mean difference is significant at the .05 level.

The variations in mean scores across groups are nominal as to have no practical impact on selection for a job.

These results indicate no adverse impact of the PXT Job Match Percent process for ethnic, gender, or age groups. While raw scores may vary among groups of people, the resulting OJMP reveals a standard by which all groups may be fairly assessed.

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