Generation and Use of Occupational Ability Profiles for Exploring O*NET™ Occupational Units

Volume I: Report

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Addendum

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This technical development report contains information based on O*NET™ 98, a prototype whose occupational classification system contains 1,122 occupational units (OUs) based on the Occupational Employment Statistics (OES) classification system.

Since the writing of this report, the O*NET 3.0 database has been developed. The major difference between this database and the O*NET 98 database is its compatibility with the 1998 Standard Occupational Classification (SOC) system.[1] By making O*NET 3.0 compatible with the SOC system, the O*NET 3.0 database now contains 974 O*NET-SOC occupations (the term "occupational unit" is no longer used), which replace the 1,122 O*NET 98 OUs. The O*NET occupations now use the SOC coding system as the basis for the O*NET-SOC occupational codes, instead of the former OES coding structure. These changes account for any differences in codes and/or titles between this report and the current O*NET-SOC structure. Please note that the U.S. Office of Management and Budget has mandated that all federal agencies' occupational classification systems be compatible with the 1998 SOC system.

All O*NET 98 data have been converted to O*NET 3.0 data and verified.

O*NET 3.0 and O*NET OnLine, a Web-based application that allows users to view and use the O*NET 3.0 database, can be accessed via the National Center for O*NET Development's Web site, www.onetcenter.org .

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[1] United States Department of Labor, Bureau of Labor Statistics. (1999). *Revising the Standard Occupational Classification System*. Washington, DC: Author.

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Introduction

The Occupational Information Network (O*NET™) Project, part of the U.S. Department of Labor's (DOL) Employment and Training Administration (ETA), has sponsored the development of several O*NET Career Exploration Tools. A primary goal of these tools is to allow clients to learn information about themselves that they can use to focus their career search activities. The O*NET Career Exploration Tools attempt to direct clients to explore occupations so as to maximize the joint probability that they (a) have (or can learn) the knowledges and skills necessary for the occupation, (b) have the basic interests that characterize people in that occupation, and (c) place a high value on work outcomes that the occupation will provide.

To achieve this focused career exploration, information pertaining to the areas just described (i.e., abilities, interests, and valued work outcomes) must be available for clients and occupations. To help determine the client's standing on abilities, interests, and work outcomes, the O*NET project developed three new assessment tools: (a) the O*NET Ability Profiler, (b) the O*NET Interest Profiler, and (c) the O*NET Work Importance Profiler. The O*NET Ability Profiler must be proctored by a trained administrator, but the other two are self-assessment tools. In addition, both the O*NET Interest and Work Importance Profilers are available in computerized and paper-and-pencil versions. Clients choose how many (and which) tools to complete during their exploration activities.

The occupations that have been linked to the O*NET assessment tools are the 1,122 Occupational Units (OUs) identified by the National Center for O*NET Development during the *Dictionary of Occupational Titles* (DOT) Conversion Project. The OUs represent a refinement of the Occupational Employment Statistics (OES) occupational classification structure and comprise most of the 12,000+ DOT occupations. The OUs were created by giving prime consideration to the DOT occupations that had similar work content and similar education and training requirements. Many OUs are one-to-one translations of DOT occupations, whereas other OUs comprise hundreds of DOT occupations.

Clients' score profiles from the completed assessment tool(s) are compared to OU-specific information related to the assessment tool(s) that clients elect to utilize. The OUs with score profiles that most closely correspond to the clients' score profiles are suggested to users as promising options for career exploration. This paper describes the generation and use of occupational ability profile information.

The O*NET Ability Profiler

The O*NET Ability Profiler (Forms 1 and 2) is actually Forms E and F of the General Aptitude Test Battery (GATB).[2] DOL has used GATB Forms A through D for more than 50 years to identify the abilities of clients engaged in career exploration. Each of the GATB Forms A through D includes 12 tests that constitute 9 aptitude scores (see Table 1). Clients receive their scores on the nine aptitudes. The aptitude scores are scaled to a mean of 100 and a standard deviation of 20 in the GATB norming population. Mean GATB aptitude scores[3] for each of 545 *Dictionary of Occupational Titles* (DOT; U.S. Department of Labor, 1991a) occupations are contained in the GATB validity database.[4]

Table 1
GATB Aptitudes and Their Constituent Tests

Aptitude Code	Aptitude Name	Constituent Tests
G	Intelligence	Three-Dimensional Space, Vocabulary, Arithmetic Reasoning
V	Verbal	Vocabulary
N	Numerical	Arithmetic Reasoning, Computation
S	Spatial	Three-Dimensional Space
P	Form Perception	Tool Matching, Form Matching
Q	Clerical	Name Comparison
K	Motor Coordination	Mark Making
F	Finger Dexterity	Place, Turn
M	Manual Dexterity	Assemble, Disassemble

[2] The name of the instrument was changed to (a) reflect the changes incorporated into the new forms, (b) reflect the way in which scores are reported and used for career exploration, and (c) complement the other assessment tools developed in support of O*NET.

[3] The mean aptitude score for a DOT occupation is the mean of the aptitude scores for the sampled incumbents in that occupation. The number of incumbents for an occupation ranged from fewer than 10 to more than 900.

[4] Of the 545 DOT occupations, only 520 had a mean score for aptitude K and only 518 had mean scores for aptitudes F and M.

Forms E and F represent alternate forms of the cognitive portion of the GATB (i.e., the tests constituting Aptitudes G, V, N, S, P, and Q)[5]. The original plans to develop Forms E and F included a review of test lengths and scoring procedures. Following a review of the GATB by a committee from the National Academy of Sciences (NAS; Hartigan & Wigdor, 1989), the project scope expanded to accommodate the recommendations of the NAS committee (Mellon, Daggett, MacManus, & Moritsch, 1996). Those recommendations were to:

- Develop new forms of the GATB that are less speeded and less susceptible to coaching by reducing the number of items and investigating the feasibility of increasing test time limits.
- Investigate and incorporate into the test the most appropriate scoring procedures, and develop instructions to examinees that clearly describe those scoring procedures.
- Develop test items free from bias, in terms of both the ethnic and gender sensitivity of the language and the statistical functioning of the items for different groups.
- Assemble test forms as parallel to each other as possible and link scores on these forms to scores from earlier forms.
- Improve the aesthetics of the test booklets and test items.
- Revise answer sheets and other related GATB materials to be consistent with changes in the test format and to provide the opportunity for examinees to maximize their test scores (Mellon et al., 1996, p. 2).

Other changes to Forms E and F included deleting the Form Matching test, renaming the Tool Matching test to "Object Matching," and administering the power tests before the speeded tests.

Overview

This paper describes the development of the ability profiles for each OU and their use in career exploration. First, the procedure for generating the OU-specific ability profiles is discussed. It is the OU ability profiles that are used to link a client's O*NET Ability Profiler scores to O*NET occupations. Next, the procedure for linking clients' ability profiles to OU profiles is presented. Finally, the information that clients receive on the O*NET Ability Profiler Score Report is described, as are the decision rules for determining the specific information that is presented.

[5] New forms of the psychomotor tests were investigated but not adopted (see HRStrategies, 1994).

Identifying the Information to be Included in the Occupational Ability Profiles

Initially, it was thought that all abilities would be included in the occupational ability profiles. However, several modifications were made to make the profiles more comprehensive and flexible for users. These modifications are discussed below.

Rationale

The primary goal of the O*NET Career Exploration Tools was to provide a flexible approach to identifying client characteristics that could inform career exploration. Toward this goal, the scores provided in a client's ability profile were modified slightly from those traditionally associated with the GATB. In addition, the system allows linkages of clients to OUs with a reduced set of O*NET Ability Profiler scores. That is, it was necessary to build a system that would allow career exploration in the absence of scores on the manual/psychomotor abilities (i.e., K, F, and M). This would allow programs to administer the O*NET Ability Profiler with or without the psychomotor tests, depending on their program constraints and clients' needs. For example, without the psychomotor tests, less equipment, fewer administrators, and less time is required to administer the instrument.

Deriving Arithmetic Reasoning and Computation Scores

In developing the information to be included in the ability profiles, the N score, which was previously reported with other forms of the GATB, was examined. It was decided to split the N ability score into its two component tests (Arithmetic Reasoning and Computation). Reporting scores for each test provides more refined information about a client's numerical ability because the tests measure somewhat different components of numerical aptitude (a power and speed component, respectively). This would enable clients to better understand their results and use them to explore careers. It would also provide more information to counselors when discussing vocational options with clients.

Flexible Profiles (with and without Psychomotor Abilities)

As mentioned previously, it was highly desirable for user programs to have the capacity to administer the O*NET Ability Profiler with or without psychomotor tests (these are the performance tests that constitute the K, F, and M abilities). This option would allow users to tailor the administration more toward individual clients. For example, clients who may not be interested in occupations that require "strong psychomotor" abilities would not have to take the psychomotor portions of the test. Additionally, the optional administration of the psychomotor portions would reduce the administration requirements in terms of equipment, personnel, and time. This might allow programs to offer the O*NET Ability Profiler to more clients. Scores on these three abilities appear in each OU score profile, but the scores can be disregarded during profile matching should a client not have corresponding scores.

Generating Estimated Ability Score Profiles for the OUs

Once the information to be included in the ability profiles was identified, procedures for generating the profiles were developed, starting with a review of existing GATB information. Although mean GATB aptitude scores were available for 545 DOT occupations through the GATB validity database, this rather large sample of occupations represents but a small fraction of the more than 12,000 DOT occupations. Further, the ability profile information was required at the OU level, not at the DOT occupation level. Therefore, the generation of OU-specific ability score profiles required two stages:

Stage 1: Generating ability score profiles for all DOT occupations.

Stage 2: Generating ability score profiles for the OUs from the ability score profiles for the constituent DOT occupations.

Stage 1: Generating Ability Score Profiles for All DOT Occupations

Overview

In addition to the mean GATB aptitude scores, most of the DOT occupations in the validity database had a vector of DOT job analysis information (e.g., job analysts' ratings of such variables as DATA, PEOPLE, THINGS, Specific Vocational Preparation, and the GATB aptitudes). These DOT data, drawn from the background information underlying the 1991 *Dictionary of Occupational Titles* (U.S. Department of Labor, 1991a), were used to generate ability profiles for each of the 12,000+ DOT occupations.

This stage encompassed two steps. The first step was to reduce the 61 potential predictor variables (constituting the DOT job analysis information) to a more manageable number via principal components analysis. A seven-component solution was retained. The second step was to regress the occupation mean ability scores on the component scores. The result was a set of equations for predicting the mean ability score for any DOT occupation, given a set of component scores (derived from the DOT job analysis information). Prediction equations were developed for seven GATB aptitudes (Verbal [V], Spatial [S], Perceptual [P], Clerical [Q], Psychomotor [K], Finger Dexterity [F], and Manual Dexterity [M]) and two GATB tests (Arithmetic Reasoning [AR] and Computation [CM])[6]. Clients who complete the O*NET Ability Profiler receive their scores on these nine abilities on the O*NET Ability Profiler Score Report.[7]

The following sections present (a) the DOT job analysis variables entered into the principal components analysis, (b) the results of the principal components analysis (including a description of the seven components), and (c) the results of the regression analyses.

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[6] Note that two of the standard nine GATB aptitude scores—General Intelligence (G) and Numerical Aptitude (N)—are not included here. The G aptitude was excluded because it is redundant with aptitudes V, S, and N. As mentioned previously, the N aptitude was split into its two component tests (Arithmetic Reasoning and Computation).

[7] For simplicity, the remainder of the report will refer to these nine scores as the nine O*NET Ability Profiler abilities.

Selection of Potential Predictor Variables

Information from 48 of the 61 DOT variables was used to predict the mean ability scores for the 545 occupations in the GATB validity database. The variables entered into the principal components analysis were as follows:

- DATA, PEOPLE, THINGS;
- Reasoning, Math, Language;
- Specific Vocational Preparation (SVP);
- Physical Demands (Strength, Climbing, Balance, Stooping, Kneeling, Crouching, Crawling, Reaching, Handling, Fingering, Feeling, Talking, Hearing, Tasting/Smelling, Near Acuity, Far Acuity, Depth Perception, Accommodation, Color Vision, Field of Vision);
- Temperaments (Directing, Repetitive, Influencing, Variety, Expressing, Stress, Tolerances, Under [Specific Instructions], People, Judgments);
- Aptitude Ratings (G, V, N, S, P, Q, K, F, and M) which correspond to the GATB aptitudes;
- Aptitude Ratings I (Eye-Hand-Foot Coordination) and C (Color Discrimination).

The remaining 13 job analysis variables from the DOT provide information about Environmental Conditions (Exposure to Weather, Extreme Cold, Extreme Heat, Wet/Humid, Vibration, Atmospheric Conditions, Proximity to Moving Mechanical Parts, Exposure to Electrical Shock, Working in High Exposed Places, Exposure to Radiation, Working with Explosives, Exposure to Toxic/Caustic Chemicals, Other Environmental Conditions). These 13 variables were excluded from the components analysis, however, because they evidence little variance across occupations and thus are of limited use for differentiating occupations.

Development of the Reduced Predictor Set

Principal Components Analyses. The first step toward generating ability profiles for each DOT occupation was to reduce the number of DOT variables while retaining as much of the variance (i.e., information) in the scores as possible[8]. This is an appropriate job for principal components analysis (PCA). A PCA of the 48 chosen DOT variables was conducted first to determine (a) how many components (i.e., combinations of variables that are formed according to certain statistical criteria) had eigenvalues greater than 1.0 (in accordance with the Kaiser criterion), and (b) the percentage of score variance accounted for by the components.

Eleven components had eigenvalues greater than 1.0. These 11 components accounted for 68 percent of the score variance. Another criterion to examine in a PCA is the number of components that are required to account for at least 50 percent of the score variance. When a correlation matrix for a set of measures exhibits positive manifold (as happens

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[8] The goal of the variable-reduction step was to reduce the potential for high degrees of multicollinearity (i.e., high correlations) among the DOT variables. High multicollinearity decreases the stability of the estimated regression parameters.

when the measures are relatively homogeneous in content, such as measures of cognitive ability), the first component typically accounts for far more than 50 percent of the score variance. When the variables are more heterogeneous in content, however, several components can be required to capture 50 percent of the variance. The 48 DOT variables included in this PCA are quite heterogeneous in content (i.e., they measure very different aspects of the job—requirements, conditions, etc.). Accordingly, five components were required to capture at least 50 percent of the variance in the scores on the DOT variables. Because 11 predictors make for a relatively unwieldy model and because it is desirable to retain at least 50 percent of the variance in the original variables, PCA solutions were examined that retained five, six, seven, and nine components.

Principal components are orthogonal (i.e., uncorrelated) by definition. Many times, it is difficult to interpret the meaning of orthogonal components. The primary concern in this exercise was to find a set of predictors that would predict the mean ability scores across occupations. The interpretability of the components was secondary to finding a set that could predict the nine scores. Even so, the components were allowed to correlate so that they might yield more interpretable components. The components were rotated obliquely using the promax procedure. Component intercorrelations were generally less than .20, with the maximum correlation for each of the solutions being ±.38.

Final Components in the Predictor Set. The five- and six-component solutions had the drawback that DATA, PEOPLE, and THINGS did not load on separate components. Specifically, DATA and PEOPLE each loaded on the first component. The nine-component solution did separate the three variables onto separate components, but nine is a rather large number of components. The seven-component solution was examined next. This solution was chosen because it reduced the number of predictors by two (from nine to seven), captured a respectable 58 percent of the score variance, and retained the separation of DATA, PEOPLE, and THINGS onto different components. The seven component scores for each OU were calculated and saved. These values served as the predictors in the regression analyses (Step 2). The rotated loadings of the 48 DOT variables on the seven principal components are presented in Table 2.

Table 2

DOT Variable Loadings on the Components Used to Predict OU Ability Profiles (n = 12,761 jobs)

Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7
Reason	**.93**						
Math	**.91**						
Language	**.90**						
SVP	**.87**						
Judgments	**.71**						
Hearing	**.55**			.54			
Q	**-.78**						
Repetitive	**-.78**						
DATA	**-.84**						
V	**-.85**						
N	**-.88**						
G	**-.89**						
M		**.83**					
K		**.77**					
THINGS		**.68**					
F		**.62**					
S	-.50	**.55**					
P	-.42	**.47**					
Influence		**.34**					
Crouching			**.86**				
Kneeling			**.83**				
Stooping			**.80**				
Climbing			**.63**				
Balance			**.56**			.32	
Crawling			**.47**				
Strength	.38		**.44**				
DealPeople	.43			**.64**			
Direct	.45			**.60**			
Talking	.56			**.56**			
Variety	.31			**.50**			
PEOPLE	-.51			**-.60**			
Tolerance				**-.61**			
Handling	-.45				**.74**		
Reaching	-.47				**.72**		
Fingering					**.66**		
Near Acuity	.41				**.58**		
Accommodation	.32				**.34**		
Under		(.08)			(.08)		
Field of Vision						**.82**	
Far Acuity						**.79**	
Stress						**.40**	
Depth Perception		(-.28)				**.27**	
I						**-.52**	
Color Vision							**.92**
Feeling							**.33**
Taste/Smell							(.25)
Express							(.23)
C							**-.90**

Note. All significant values are presented. Values in parentheses give the largest factor loading for variables that failed to load significantly on any of the seven components. Loadings in boldface indicate the component to which the variable was assigned. DATA, PEOPLE, THINGS, G, V, N, S, P, Q, K, F, M, I, and C are reverse-scaled (i.e., lowest values are assigned to highest levels of the attribute being measured). Therefore, the signs of their loadings should be reversed for proper interpretation of the principal components.

The following labels are suggested for the seven principal components in Table 2:

- **Component 1 (PC1) = Job Complexity.**
  Constituent variables: Reasoning; Math; Language; SVP; Judgments; Hearing; aptitude ratings Q, V, N, and G; Repetitive; and DATA.

- **Component 2 (PC2) = Dealing with Things.** This component comprises variables having a high manual/psychomotor influence.
  Constituent variables: Aptitude ratings K, F, M, S, and P; THINGS; and Influence.

- **Component 3 (PC3) = Gross Motor Movements.**
  Constituent variables: Crouching, Kneeling, Stooping, Climbing, Balance, Crawling, and Strength.

- **Component 4 (PC4) = Dealing with People.**
  Constituent variables: Dealing with People, Direct, Talking, Variety, PEOPLE, and Tolerance.

- **Component 5 (PC5) = Gross Manual Dexterity/Manipulation.**
  Constituent variables: Handling, Reaching, Fingering, Near Acuity, Accommodation, and Under.[9]

- **Component 6 (PC6) = Close-Up Work.** Similar to component seven, but this seems to embody work of a more tedious, delicate nature.
  Constituent variables: Field of Vision, Far Acuity, Stress, Depth Perception, aptitude rating I.

- **Component 7 (PC7) = Color Vision.**
  Constituent variables: Color Vision, Feeling, Taste/Smell, Express, aptitude rating C.

[9] The aptitude ratings for F and M do not load highly here. It is important to note that (a) these are *ratings* of the aptitude's importance, and (b), as described in the next section of this report, several other aptitude ratings predict the mean score for M better than do the ratings of M.

Estimating Ability Profiles

Development of Prediction Equations. Having reduced the 48 DOT variables to a more manageable set of seven component scores, the next step was simply to regress each of the nine aptitude dimensions on the set of principal components scores. The purpose of the analyses was to derive ability-specific prediction equations so that ability scores could be estimated for those DOT occupations that have DOT information but are not in the GATB validity database. For each ability, the observed mean scores across DOT occupations served as the dependent variable (i.e., the DOT occupation was the unit of analysis); the seven component scores were the independent variables. To obtain the AR and CM scores from the validity database, the Numeric (N) aptitude scores were first decomposed into their constituent AR and CM test scores using a regression procedure devised by Boese (personal communication, 1996). The mean AR and CM scores of the DOT occupations were then predicted using the seven component scores.

A derivation sample comprising a randomly selected 60 percent of the DOT occupations was obtained and used to generate the prediction equation for each ability score using the seven component scores. These ability-specific equations were then applied to the remaining holdout sample comprising the remaining 40 percent of the DOT occupations. This procedure was repeated 50 times for each ability, thus providing 50 estimates of the cross-validated coefficient of determination (R^2), which indexes the predictive relationship between the mean ability scores and the predictor variables (i.e., the seven component scores). The 50-replicate bootstrapping procedure provided information about the sensitivity of the regression equations to the sampling of DOT occupations. The results of the bootstrap analysis, given in Table 3, indicate a moderate amount of shrinkage in the cross-validation sample (mean decrease of about .011) that agrees rather closely with that expected from the Rozeboom (1978) shrinkage formula. Also, an increase in the standard deviations of the R^2 values of about 50 percent was observed. In general, these results were about what was expected—they do not suggest remarkable amounts of sensitivity or insensitivity to the jobs included in the estimation sample.

The next step was to produce an operational prediction equation for each ability. The operational equation was obtained by estimating the prediction equation using all DOT occupations (i.e., a total-sample equation). The results (presented in Table 4) indicated that abilities V, S, AR, and CM were predicted quite well (R^2 values ranging from about .56 to about .62); abilities P, Q, and K were predicted moderately well (R^2 values ranging from about .37 to about .46); and abilities F and M were predicted less well (R^2 values ranging from about .08 to about .13).

Table 3
Summary of the 50-Replicate Bootstrap Analysis

60% Derivation Sample

Ability	Mean R^2	Standard Deviation	Minimum R^2	Maximum R^2
V	.620	.016	.594	.651
S	.567	.018	.513	.592
P	.388	.021	.342	.432
Q	.461	.019	.425	.509
K	.379	.020	.331	.420
F	.135	.017	.101	.178
M	.080	.016	.055	.128
N*	.579	.020	.535	.618

40% Cross-Validation Sample

Ability	Mean R^2	Standard Deviation	Minimum R^2	Maximum R^2
V	.607	.024	.553	.648
S	.568	.025	.530	.640
P	.376	.031	.307	.446
Q	.443	.030	.369	.502
K	.357	.029	.301	.432
F	.125	.025	.069	.175
M	.066	.021	.021	.107
N*	.575	.029	.517	.639

* The sensitivity analyses were completed before the decision was made to split the N ability into its two component tests. The results for the N ability score are provided in their place.

Table 4
*Final Prediction Equations for Each O*NET Ability Profiler Ability Score*

			Coefficient							
Ability	n_j	R^2	Intrcpt	FS1	FS2	FS3	FS4	FS5	FS6	FS7
V	937	.616	96.859637 (355.27)	8.592541 (34.36)	0.871153 (3.56)	-1.520958 (-7.28)	1.494421 (6.04)	0.258431 (1.03)	0.327597 (1.46)	0.236503 (0.98)
S	937	.569	99.175289 (330.04)	8.326245 (30.21)	-1.645178 (-6.10)	-0.462324 (-2.01)	-0.619359 (-2.27)	-0.442976 (-1.61)	0.699527 (2.83)	0.238957 (0.90)
P	937	.385	102.066945 (285.72)	7.062423 (21.55)	-0.335751 (-1.05)	-2.136149 (-7.81)	0.503514 (1.55)	0.574125 (1.75)	0.702170 (2.39)	-0.263131 (-0.84)
Q	937	.456	104.830921 (299.84)	7.554241 (23.56)	1.072291 (3.41)	-2.289565 (-8.55)	1.389358 (4.38)	0.911530 (2.84)	0.409402 (1.42)	-1.037982 (-3.37)
K	897	.372	101.909633 (332.22)	4.805959 (17.17)	0.692188 (2.51)	-2.362383 (-10.19)	1.713179 (6.13)	0.977317 (3.47)	0.388411 (1.57)	-0.062728 (-0.23)
F	891	.134	97.408171 (303.21)	1.989363 (6.73)	-1.175474 (-4.03)	-1.797664 (-7.42)	0.561681 (1.92)	1.152417 (3.91)	-0.014761 (-0.06)	0.184756 (0.66)
M	891	.077	104.324983 (299.01)	1.951354 (6.07)	-1.286125 (-4.06)	-0.960105 (-3.65)	0.357377 (1.13)	0.369497 (1.16)	0.489624 (1.74)	-0.237909 (-0.78)
AR	937	.580	10.779809 (182.95)	1.788931 (33.10)	0.078811 (1.49)	-0.170643 (-3.78)	-0.046493 (-0.87)	-0.015091 (-0.28)	0.133395 (2.749)	0.063817 (1.229)
CM	937	.557	20.904496 (214.40)	2.811663 (31.44)	0.168872 (1.93)	-0.466562 (-6.25)	0.061481 (0.69)	0.066141 (0.74)	0.217441 (2.71)	-0.087712 (-1.02)

Note. n_j = the number of jobs contributing to the regression; R^2 = the squared multiple correlation; FS1 – FS7 are the component scores on the seven components PC1 – PC7; values in parentheses are *t*-test values for the regression parameters.

Generating Estimated Abilities. The total-sample prediction equations for each of the abilities/tests were used to generate estimated ability scores for approximately 11,500 DOT occupations, including those with actual observed ability scores[10]. Estimated profiles were used, rather than a combination of estimated and actual profiles, so that all occupation profiles could be considered comparable (e.g., have same component of predictive error, show same regression to the mean). Thus, systematic differences between observed and estimated profiles (i.e., greater variability among observed scores) would not artificially influence the matching of an individual's profile to OU profiles.

[10] The DOT Conversion Project identified the DOT occupations constituting each OU. During the process of linking DOT occupations with OUs, several DOT jobs were removed or collapsed into other DOT categories. Similarly, some OUs contained new DOT occupations for which no DOT data were available. Thus, the original set of 12,761 DOT occupations was modified to approximately 11,500 occupations during the Conversion Project. As a result, estimated ability score profiles were developed for the approximately 11,500 DOT occupations.

Stage 2: Generating Ability Score Profiles for the OUs

Overview

Given estimated ability profiles for each DOT occupation, it remained to generate ability profiles for each of the 1,122 OUs included in O*NET. Each OU profile was derived from the profile(s) of the "core" DOT occupation(s) constituting the OU—those occupations considered most characteristic (or representative) of the DOT occupations within a particular OU. This section describes the three-step procedure adopted for identifying the core DOT occupations within an OU and deriving the OU-specific profile from the core occupations. Prior to this procedure, however, the ability score profiles for the DOT occupations were standardized. The rationale for the standardization step is also described in this section.

Standardization of Estimated Ability Scores

It is important to note that before the OU ability score profiles were calculated, the estimated scores for each ability were standardized to a mean of 100 and a standard deviation of 20 across the nearly 11,500 DOT occupations. Standardization served two purposes:

1. It equated the variance of the predicted scores across ability areas, thus reducing the problem of restricted variance in those estimated ability scores that were predicted less well.

2. It placed the estimated ability scores for the OUs on the same scale as that applied to the observed O*NET Ability Profiler scores for individuals.

Standardization was not necessary for the algorithm used to determine similarity of person and OU score profiles. Should the raw scores for the OUs ever be available to a client, however, it is imperative that scores be comparable (i.e., on the same scale).

By standardizing before identifying the core DOT occupations, there was no guarantee that the OU ability score profiles would have a mean of 100 and standard deviation of 20. Indeed, the mean for abilities across OUs is about 112 with a standard deviation of about 19. It would be undesirable for these ability scores to be re-standardized *across OUs* (i.e., the finalized set of 1,122) to a mean of 100 and standard deviation of 20. Table 5 contains information that can be used to demonstrate why this would be a questionable idea.

Table 5
Effects of Re-Standardization on Client Scores from the O*NET Ability Profiler

Client O*NET Ability Profiler Score	*z* score	Current OU	*z* score (OU Base)	Equated Score on Original Person Scale
120	1.0	120	0.42	108.42
110	0.5	110	-0.11	97.89
100	0.0	100	-0.63	87.37
90	-0.5	90	-1.16	76.84
80	-1.0	80	-1.68	66.32

The first column of Table 5 gives five values for clients on the O*NET Ability Profiler. The second column shows the client scores as standardized, or *z*, scores (i.e., the number of standard deviations the score is from the mean). The third column gives what the score is equivalent to per the current standardization of the OUs. This is so because the metric for the OUs comes from that for the DOT occupations, which in turn comes from the GATB scores of the incumbents.[11] Column four provides the *z* score for the original client score relative to the mean and standard deviation for the estimated ability scores for the OUs (*m* = 112, *sd* = 19), and column five gives the column four *z* score in the original client metric.

For example, a client's score of 110 is one-half standard deviation (10 points, *z* = 0.5) above the mean (*m* = 100) on the GATB/O*NET Ability Profiler scale (*m* = 100, *sd* = 20). The current OU metric also assumes *m* = 100, *sd* = 20, and, thus, columns one and three are equivalent: a client's score of 110 is directly comparable to an estimated ability score for an OU of 110. Column four shows the *z* score that a score of 110 represents for a distribution where *m* = 112 and *sd* = 19 (i.e., the distribution of the estimated ability scores for the core DOT occupations). Because 110 < 112, the *z* score is negative, and it shows that the score is about one-tenth a standard deviation less than the mean (i.e., -2/19 = -0.11). Column five shows what score a client would receive who had a *z* score of -0.11 on the original GATB/O*NET Ability Profiler metric.

Re-standardizing the distribution of estimated ability scores from *m* = 112, *sd* = 19 to *m* = 100, *sd* = 20 would result in clients believing they have the abilities needed for OUs when they may not. To see this, consider a person with a score of 100 on the Verbal ability—a mean score. Let us say that OU X requires a Verbal ability score of 112, which is 0.6 standard deviations above the mean for that ability. The person is thus unqualified for OU

[11] Actually, the OU-to-GATB linkage is *not* direct. The estimated ability scores for the DOT occupations do represent a direct linkage to the individual GATB scores. However, recall that the predicted scores were standardized to metrics of *m* = 100 and *sd* = 20 prior to identifying the core DOT occupations. This had the advantage of equalizing the variance of the predicted scores for each ability. It did, however, alter the scale a bit for the predicted ability scores for the DOT occupations, and it is the predicted ability scores that are the basis for the OU mean ability scores.

X. Let us now re-standardize the OU ability scores to $m = 100$, $sd = 20$. The original mean score for the Verbal ability ($m = 112$) is now rescaled to be 100. If reported thus, the person with a Verbal score of 100 will believe him/herself to have the necessary abilities when in fact he/she may not[12]. The mean of 112 has been "demoted" to a score of 100. The scales are no longer comparable.

Table 5 shows that the same situation occurs for individuals' scores both above and below the mean score of 100 for a given ability. Column four of the table shows that an individual's score of 120 on an ability (one standard deviation above the mean) would be rescaled as a score of 108.42 in the re-standardized schema. Thus, persons scoring only one-half standard deviation above the mean on the O*NET Ability Profiler (a score of 110) for an ability would be labeled "qualified" when in fact they were not—they needed to have scored an additional one-half standard deviation higher than they did. The same situation occurs for individuals' ability scores below the normed mean of 100.

Generating Mean Ability Scores

The DOT Conversion Project identified the DOT occupations constituting each OU. The number of DOT occupations within a given OU varied greatly, ranging from 1 to 696.

Given multiple DOT occupations for many OUs, the goal was to compute the OU's ability score profile from the DOT occupations that best represented the central core, or content, of the OU. That is, for each OU, the core DOT occupations were identified and averaged to yield the OU score profile. The procedure for developing the OU ability score profile involved the following steps, which were conditional on the size of the OU.

Step 1: OUs with Fewer than Seven DOT Occupations. For all OUs with fewer than seven DOT occupations (73% of the OUs analyzed), the overall mean of each ability was computed. With fewer than seven DOT occupations, each job in these small OUs was argued to be a "core" job.

Step 2: OUs with Seven to Twenty-Four DOT Occupations. The mean was argued to provide a less adequate summary for OUs comprising seven or more DOT occupations. Therefore, a procedure was necessary for identifying core DOT occupations from among the total DOT occupations within an OU. For OUs containing 7-24 DOT occupations (21% of the OUs analyzed), the profiles of estimated ability scores for the individual occupations were analyzed via principal components to identify the first principal component for that OU. The mean ability score was computed for the six jobs in the OU that loaded highest on this first component (factor). This procedure was used to (a) identify the core jobs that would best represent the OU and then (b) base the ability score profile for the OU on data from those core jobs.

Step 3: OUs with More than Twenty-Four DOT Occupations. For OUs comprising more than 24 occupations (5.5% of the OUs analyzed), the array of occupations was first

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[12] Restandardizing the estimated ability score distribution to a lower mean is equivalent to shifting the distribution left on the number line. Therefore, it is not possible for a client to have the required level of abilities but be led to believe he or she does not.

examined for outliers by generating the distribution of Specific Vocational Preparation (SVP) ratings. (The scale for this variable is presented later in this report in the section entitled "The O*NET Ability Profiler Score Report.") In general, only occupations with one of the three most frequent SVP scores were retained. That is, occupations with extreme SVP scores (i.e., judged to require much less or much more education/training than the bulk of the occupations in the OU) were eliminated, on the grounds that they might have an undue influence on the principal component. The estimated ability profiles for the remaining occupations were then analyzed by principal components. The loadings of the occupations on the first principal component were then rank-ordered. Those occupations having loadings in the top 25 percent of all loadings on the first component were selected, and mean ability scores were then computed for them. Again, this was all for the purpose of computing an ability score profile for an OU in such a manner that the profile represented the core occupations of the OU.

The rationale for the procedure is as follows. First, calculating a mean profile across six or fewer occupations will yield a profile that is reasonably representative of each of the occupation-specific profiles within the OU. Mean profiles for OUs comprising a greater number of occupations would likely not characterize all of the occupations reasonably well. (Although 6 occupations was the selected cutoff, other values, such as 5 or 8 or 10, could also have been chosen.) Steps 2 and 3 use the method of principal components analysis to identify the occupations that are most alike with an OU. Step 2 differs from step 3 in that, for OUs having from 7 to 23 occupations, more than 25 percent of the occupations within the OU constitute the core occupations. This difference allows for the rather arbitrary cut of "fewer than seven DOT occupations" by permitting more of the occupations within the smaller OUs to contribute to each mean ability score and, thus, to the OU ability score profile.

OUs with More than 300 DOT Occupations. One exception to the above procedure should be noted. Five OUs comprised more than 300 DOT occupations:[13]

- OU 81008: *First-Line Supervisors and Manager/Supervisors - Production and Operating Workers* (696 occupations),
- OU 83005A: *Production Inspectors, Testers, Graders, Sorters, Samplers, Weighers* (653 occupations),
- OU 92965: *Crushing, Grinding, Mixing, and Blending Machine Operators and Tenders* (357 occupations),
- OU 93956: *Assemblers and Fabricators - Except Machine, Electrical, Electronic, and Precision* (455 occupations), and
- OU 98999A: *Production Laborers* (497 occupations).

One original aim of the analyses in support of O*NET was to develop a set of OU categories, or clusters. The smaller number of OU clusters (say, 100 or so) were to support clients' manual use of the O*NET Career Exploration Tools. Each of the five OUs just listed was considered a cluster in its own right, due to its size. As such, they were set aside and not

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[13] One other OU, "All Other Machine Operators and Tenders" (OU 92998) also comprised more than 300 DOT occupations but is not discussed here as it is one of the 50 "All Other" OUs that are not presently part of O*NET 98 (see next footnote).

considered for the primary analyses presented here. Having been excluded from the core DOT analyses, the ability profile for each of these large OUs was formed simply by taking the arithmetic mean of the component occupation profiles (i.e., they were treated similarly to the very small OUs).

*Review of the Final O*NET OU Ability Profiles*

The final estimated mean ability profiles for the 1,172 O*NET OUs [14] provide the target for identifying the most promising occupations for clients to explore, given their current abilities as identified using the O*NET Ability Profiler. The procedures just described ensure the profiles represent the core DOT occupations within each OU. The complete set of profiles appears in Volume II of this report.

Linking Individual O*NET Ability Profiler Scores to O*NET OUs

Score Calibration

Overview

As mentioned, the O*NET Ability Profiler comprises newly developed GATB Forms E and F. To permit proper interpretation, client scores must be compared to an appropriate norming group—client scores derive meaning from their relative standing to scores for the norming group. GATB Forms A through D are linked to appropriate norming samples through score calibration procedures. This section describes the calibration procedures that link the O*NET Ability Profiler to the GATB norm group and, thus, permit proper interpretation of O*NET Ability Profiler scores. Note that all of these procedures are performed by the O*NET Ability Profiler Scoring Program (National Center for O*NET Development, 1999). The information presented below provides an overview of the steps the software completes to provide meaningful O*NET Ability Profiler scores.

Deriving GATB Form A Converted Scores

The calibration of O*NET Ability Profiler scores to the GATB norming group is easy to achieve, involves just a few steps, and is completed by the O*NET Ability Profiler Scoring Program (National Center for O*NET Development, 1999). Assume that a client has completed the O*NET Ability Profiler, Form 1 (GATB Form E). The client then has *raw scores* on 11 GATB tests (if the psychomotor tests were completed). These 11 scores are first calibrated to the corresponding *converted scores* for GATB Form A. An equating study directed by Dr. Dan Segall (now at the Defense Manpower Data Center in Monterey, CA) provides the requisite information for beginning the calibration (Segall & Monzon, 1995). Specifically, the report for the equating study contains equating tables that translate Form E and Form F raw test scores to GATB Form A converted scores. Converted scores show the contribution of a given test to each composite of which it is a component. Equating tables are provided for the following tests: Arithmetic Reasoning, Vocabulary, 3D Space,

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[14] A total of 1,122 O*NET OUs are included in O*NET 98. However, an additional 50 OUs exist which cover "All Other" categories of jobs. For potential use in the future, estimated ability profiles were also generated for these 50 OUs.

Computation, Name Comparison, and Object Matching. Several tests are missing from this list. First, Form Matching was excluded from Forms E and F. Second, there are no Forms E and F versions of the psychomotor tests. The required steps for score calibration are described below for the three types of abilities.

Psychomotor Abilities. There are no new psychomotor tests for Forms E and F. Thus, abilities K, F, and M require no equating tables. The steps for obtaining percentile scores for abilities K, F, and M are as follows:

- Obtain the client's raw test score.
- Determine the raw score's corresponding converted score for the appropriate GATB form.
- For Part 8, which alone converts to the K score, use this converted score.
- For Parts 9 and 10, obtain the converted scores for each part and sum them to obtain the M ability score.
- For Parts 11 and 12, obtain the converted scores for each part and sum them to obtain the F ability score.
- Calculate a *z*-score for the obtained converted K, F, or M ability score using the mean and standard deviation of the abilities (i.e., $m = 100$, $sd = 20$).
- Obtain the appropriate percentile value for the *z*-score from the normal curve.

Cognitive Abilities. After calibrating the psychomotor tests, four abilities (V, S, P, Q) and two tests (Arithmetic Reasoning and Computation) remain. Each of the four abilities is a single-test ability (i.e., they are not composites). Hence, calibration of the specific test for each ability results in calibrating the corresponding ability in the same manner that Part 8 scores are converted into K scores above. For example, Ability S comprises the 3D-Space test. By calibrating the 3D-Space test, we simultaneously calibrate Ability S. The steps required to obtain percentile scores for these abilities are as follows:

- Obtain the client's raw test score.
- Enter the appropriate O*NET Ability Profiler form's equating table for the test in question.
- Identify the corresponding converted score from the equating table.
- Calculate a *z*-score for the obtained converted V, S, P, or Q ability score using the mean and standard deviation of the abilities (i.e., $m = 100$, $sd = 20$).
- Obtain the appropriate percentile value for the *z*-score from the normal curve.

Numeric Abilities. The Arithmetic Reasoning and Computation tests do not convert to a GATB ability score. Therefore, they must be converted differently than the abilities. The steps required to obtain percentile scores for these tests are as follows:

- Obtain the client's raw test score.
- Enter the appropriate O*NET Ability Profiler form's equating table for the test in question.
- Identify the corresponding converted score from the equating table.
- Enter the appropriate test conversion table for Form B (i.e., Part 6 for Arithmetic Reasoning, Part 2 for Computation).
- Identify the raw score that corresponds to the converted score used to enter the conversion table.
- Calculate a *z*-score for the obtained raw score using the mean and standard deviation of the Form B norming sample for the test in question.
- Obtain the appropriate percentile value for the *z*-score from the normal curve.
- NOTE: To facilitate matching of these tests to the OU profiles, the *z*-score above must be placed on the m = 100, sd = 20 metric by calculating

$$AR_{new} = z_{AR} \times 20 + 100.$$

Calculating the z-Scores and Percentile Values

One important point that applies to the two numeric GATB tests is that a given converted score from the equating tables for Forms E/F might not appear on the Form B conversion table. When this occurs, a linear regression must be performed to obtain an equation that will allow a raw score to be predicted from a converted score that does not appear in the conversion table.

For example, assume that a client obtains a raw score of 13 on the Arithmetic Reasoning test (Form F). The equating table for Form F shows the corresponding Ability N converted score to be 18. Moving to the Form B conversion table for Part 6, we see that there is no converted score of 18 under the Ability N column. Rather, the series of scores proceeds thus:

Raw score	Ability N Converted Score
11	19
10	16
9	14
8	12
7	11
6	7

The conversion table shows that a converted score of 18 for Ability N indicates a raw score between 10 and 11. Through linear regression, we can develop an equation that allows us to predict the raw score associated with a given Ability N converted score. Here, the predicted value is 10.727. This raw score would then be compared to the mean and standard deviation for the Form B Arithmetic Reasoning test. These norms are given in the *Manual for the GATB, Section III* in Chapter 5, "General Working Population Norms" (page 27). With a mean of 11.426 and a standard deviation of 3.511 in the norming sample, the value of 10.727 yields a *z*-score of

$$z = \frac{x - \bar{x}}{\sigma_x} = \frac{10.727 - 11.426}{3.511} = -0.199$$

which in turn yields a percentile score of 42.

The O*NET Ability Profiler raw test score is now (a) calibrated to its corresponding Form B raw score and (b) given in percentile form as based on the established GATB norms.

Matching Algorithm

Rationale

The *raison d'être* of O*NET Career Exploration Tools is to identify the set of OUs that most closely correspond to a client's abilities, interests, and/or work values. The key consideration in choosing an algorithm for effecting the client/OU linkage was to maximize the potential career exploration opportunities for the client. That is, the algorithm should not unduly restrict clients from exploring occupations that they might not currently have the ability or education to perform. The algorithm is needed to identify occupations that the client could attain, given appropriate education, training, and or experience, as judged from observing a client's current constellation of abilities.

Selected Algorithm

The matching algorithm for the O*NET Ability Profiler compares the client's scores on the nine abilities to the estimated OU-specific ability score profile. OUs with score profiles that most closely correspond to the client's score profile qualify as suggested candidates for the client's career exploration. The correlation coefficient serves as the index of correspondence. The correlation provides a numerical index of the similarity of the shapes (but not the levels) of the client and occupation profiles and is the approach most vocational counselors prefer for describing profile correspondence.[15]

If a client's profile correlates equally with two or more OUs, the OUs are ordered from lowest to highest on *d*, the Euclidean distance. The *d* value indexes the proximity of the person profile to the occupation profile. This distance measure introduces level into the matching process. The goal is to increase the face validity of the selected OUs by minimizing the

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[15] This same algorithm is used to identify the most correspondent OUs for clients using score profiles from the Interest Profiler and the Work Importance Profiler. A modified algorithm applies if the client has scores from two or more Profilers (for a more detailed discussion, see *Linking Client Assessment Profiles to O*NET Occupational Profiles* [McCloy, Campbell, Oswald, Lewis, & Rivkin, 1999]).

likelihood of strongly recommending occupations for which the person is highly under- or over-qualified.[16]

To demonstrate how this might work, consider the hypothetical client and OU score profiles for the O*NET Ability Profiler appearing in Figures 1 and 2. The values of the two correspondence indices—the correlation coefficient and the Euclidean distance—appear in Table 6. The values of the correlation coefficient in Table 6 indicate that the client's profile has a dissimilar shape to the score profiles for OU 1 and OU 3 (see Figure 1) and a similar shape to OU 2 and OU 4 (see Figure 2). In addition, the client profile correlates equally with the score profiles for OU 2 and OU 4. The Euclidean distance values for OU 2 and OU 4, however, indicate that the client's profile corresponds more closely with the score profile for OU 4 than for OU 2; that is, the client profile is less distant from the OU 4 profile (d = 23.24) than from the OU 2 profile (d = 34.75). Thus, given the choice of the two OUs, the client might wish to explore OU 4 first.

Table 6
Correspondence Indices for Hypothetical Client and OU Profiles from the O*NET Ability Profiler

Occupational Unit	Correlation Coefficient	Euclidean Distance
OU 1	-.46	45.06
OU 2	.68	34.75
OU 3	-.36	44.96
OU 4	.68	23.24

[16] Neither the Interest Profiler nor the Work Importance Profiler uses d to refine order of correspondence of OUs that correlate equally with the client profile.

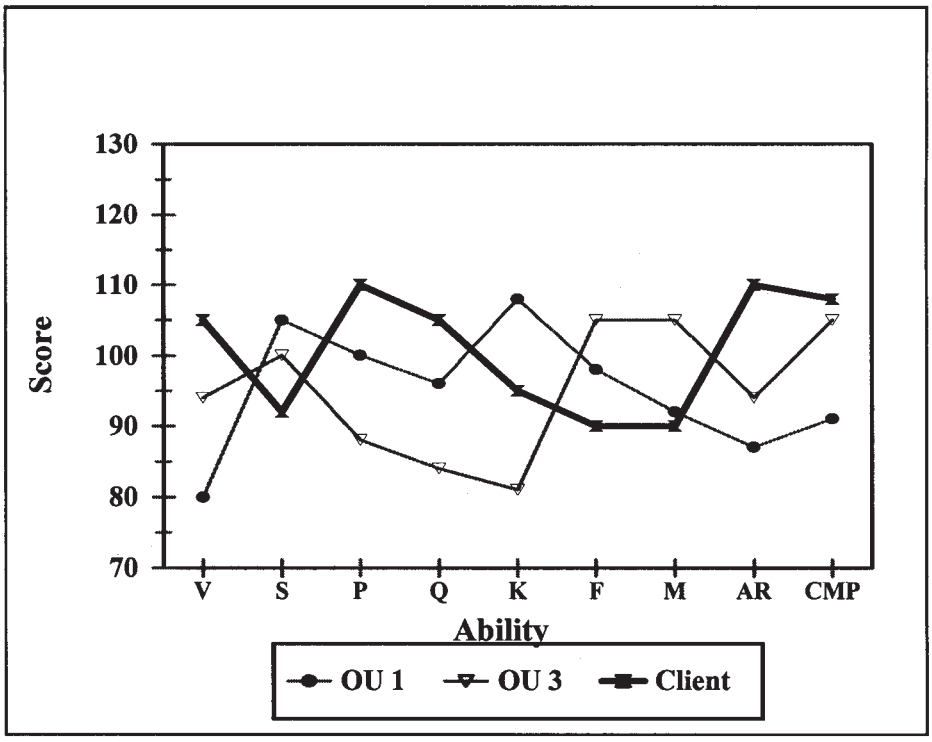

Figure 1. **Sample Client and OU Profiles for the O*NET Ability Profiler: Low Correlations**

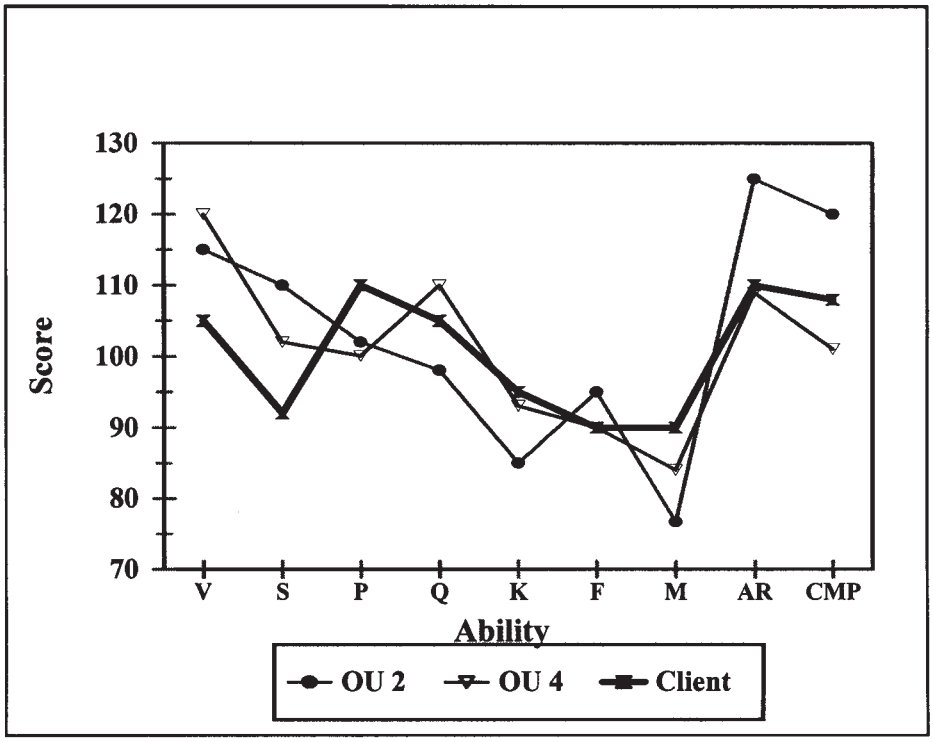

Figure 2. **Sample Client and OU Profiles for the O*NET Ability Profiler: High Correlations**

In sum, using both the correlation and the Euclidean distance provides a refined determination of the correspondence between a client profile and various OU profiles. Using the distance index only in the event of ties preserves the preeminence of profile shape (as vocational counselors suggest).

Occupations Listed

Having effected the client/OU match, the O*NET Ability Profiler Scoring Program selects a list of OUs considered most promising for career exploration. The client score profile must contain the following six ability scores: AR, CM, V, S, Q, and P. Scores on the three performance abilities (i.e., K, F, and M) are used if they are available. After calculating the correlation coefficient (and Euclidean distance, should equal correlations occur) between the client score profile and each OU score profile, the scoring program next applies a series of decision rules to the results. OUs that satisfy the various decision rules appear on the O*NET Ability Profiler Score Report. The criteria for presenting OUs are as follows.

Criteria for Presenting Occupations. The scoring program lists a minimum of 10 OUs on the score report for each of five Job Zones, regardless of the magnitude of the client/OU profile correlation[17]. OUs are presented in descending order based on the correlation.

OUs for which the client/OU correlation is of sufficient magnitude are denoted (by asterisk) as "strong matches." The degree of correlation that must be attained depends upon the number of scores in the client profile. Hence, there is a separate cutoff for profiles having six, seven, eight, and nine scores (see Table 7). The O*NET Ability Profiler Scoring Program uses double precision math to calculate the correlation between client and OU profiles. At a minimum, correlations are truncated to 10 decimal places. Table 7 reports each cutoff to its full 15-digit value. Each correlation cutoff represents the value for which the statistical significance of the correlation is $p < .10$ as derived from a one-tailed significance test. A client's score report may contain as many as 25 OUs in each Job Zone, but OUs 11-25 appear only if they represent strong matches.

Table 7
Minimum Correlation Values for an OU To Be Labeled a "Strong Match"

	Number of Scores in Client/OU Ability Profile			
	6	**7**	**8**	**9**
Minimum Correlation	.608 (399646359134)	.550 (862990741590)	.506 (726930391213)	.475 (1588585453743)

Note. Each cutoff value is a 15-digit value. In the interest of exactitude, all digits are reported in the table; to facilitate reading of the values, each cutoff is reported to three digits, with the remaining 12 digits presented below in parentheses. Each cutoff is the critical value of the correlation at $p < .10$ using a one-tailed test of significance.

[17] Each of the 1,122 OUs is assigned to one of five Job Zones: groups of occupations that require similar amounts of vocational preparation. The Job Zones are discussed in more detail in a later section.

Reporting O*NET Ability Profiler and Occupational Information

The preceding sections of this report describe how ability profiles were developed for OUs and how client information is linked to the profiles. This section describes how the O*NET Ability Profiler and occupational information are presented to clients in a meaningful way.

Overview

Clients obtain their O*NET Ability Profiler scores on the O*NET Ability Profiler Score Report (see Appendix). The document contains several types of information that clients can use to facilitate their career exploration. First, the Score Report briefly describes how the O*NET Ability Profiler can help the client explore occupations, as well as the types of information the Profiler provides (i.e., the types of abilities that are assessed). Next, the Score Report describes how the client should interpret the percentile scores that are reported. In addition to percentile scores for each ability, the Score Report lists (a) the number of items the client answered correctly and (b) the total number of items used to assess each ability.

The remainder of the Score Report describes how the client should interpret the information on occupations that is available—namely, (a) the notion of Job Zones and (b) the occupations within each Job Zone that most closely correspond to the client's score profile.

Presentation of Individuals' Ability Information

Clients receive two types of score information from the O*NET Ability Profiler score report. The first is their total correct score. The second is their percentile score, where their ability or test score places them relative to the population at large. As described earlier, the "population at large" is defined by the GATB norming sample.

Total Correct

The total-correct score is a simple tally of the number of items the client answered correctly out of the total number of items on the test. The sample client depicted on the O*NET Ability Profiler Score Report in Appendix received a score for each of the non-performance tests (i.e., [AR] Arithmetic Reasoning, [CM] Computation, [V] Verbal, [S] Spatial, [P] Form Perception, and [Q] Clerical), as well as the performance tests (i.e., [K] Motor Coordination, [F] Finger Dexterity and [M] Manual Dexterity).

Percentile Scores

The percentile score indicates the percentage of the norming group that scored at or below the level of the client. For example, a percentile score of 60 indicates that 60 percent of the norming group received a raw test score that was less than or equal to the score the client attained. The average percentile score is 50, meaning that the average client would score at the 50^{th} percentile for each ability. Percentile scores are provided for each O*NET Ability Profiler test.

Presentation of Occupations

Overview of "Job Zones"

As noted previously, to facilitate the career exploration process, the O*NET Career Exploration Tools provide information with regard to the level of knowledge and skill each OU requires. Specifically, the OUs are sorted into five categories of required knowledge and skill that are termed "Job Zones." An overview of the Job Zone development and a description of the operational use of the Job Zones are provided in the next section. It is important to note that several alternative methods for classifying preparation level were considered for inclusion within the O*NET Career Exploration Tools and that Specific Vocational Preparation (SVP) was deemed most appropriate in light of technical and operational considerations. For more detailed information on Job Zone development, see Oswald, Campbell, McCloy, Rivkin, and Lewis (1999).

Selection of Specific Vocational Preparation

The necessary level of knowledge and skill for an OU is defined by the DOT rating of Specific Vocational Preparation (SVP), which is intended to measure the required level of specific occupational training and experience. The definition of SVP given by *The Revised Handbook for Analyzing Jobs* (U.S. Department of Labor, 1991b) is

> "the amount of lapsed time required by a typical worker to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job-worker situation" (p. 8-1; see Figure 3 for the SVP rating scale).

Level	Time[1]
1	Short demonstration only
2	Anything beyond short demonstration up to and including 1 month
3	Over 1 month up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

Note. The levels of this scale are mutually exclusive and do not overlap.
[1]Time that applies to General Educational Development is not considered in estimating Specific Vocational Preparation.

Figure 3. **Scale of Specific Vocational Preparation**

In essence, SVP quantifies the amount of occupation-specific education, training, and experience that is required to perform successfully in the occupation. SVP may not be the "exact" level of the necessary knowledge and skill in all cases, but it is the most appropriate

feasible alternative among the variables in the DOT.[18]

The SVP rating has two other important advantages. First, the level of the SVP requirement for an occupation can be directly linked to the level of specific occupational education and training achieved by the client. It can also be used to describe the future level of SVP that the client might intend to achieve. Consequently, clients can also ask what new occupations they should explore *if* they are planning to pursue certain education/training opportunities. This could be used to illustrate in a very concrete way the value of additional training. Using SVP to stratify enables the O*NET Career Exploration Tools to have this capability.

Second, using SVP rather than an index of general cognitive ability (*g*) or "job complexity" (which were also examined as possibilities) reduces the direct effects of *g* on the procedure for linking individuals to occupations. Although there is a significant correlation between general cognitive ability and the level of training achieved by individuals, there are many other determinants of education and training success (e.g., motivation). Stratifying occupations on SVP first reflects these other determinants and reduces the degree to which the subsequent occupational linkage was a direct function of *g*.

Several variations to SVP alone could be envisioned and were explored, using data from the DOT. Various metrics for measuring the required knowledge and skill of the OUs were created and evaluated for use with the O*NET Career Exploration Tools, but SVP was chosen. The most attractive alternative was a metric that provided a bipolar representation of technical *vs.* interpersonal complexity, with technically complex jobs on the high end and interpersonally complex jobs at the low end. This bipolar measure was not chosen, however, given that (a) SVP is a more straightforward measure and can be obtained for both clients and occupations, (b) general occupational level is a unidimensional construct, whereas technical and interpersonal aspects of occupations may better be represented multidimensionally, and (c) the bipolar measure is a more complex measure and yet less differentiating of many occupations than SVP (those not extreme with regard to technical or interpersonal complexity; see Oswald et al., 1999).

As with the estimated ability profiles, SVP ratings were available for each of the DOT occupations. OU SVP values were obtained by averaging the SVP ratings for the core DOT occupations within each OU.

Estimation of SVP Values for OUs

Just as scores on the GATB were available for DOT occupations, SVP ratings were also provided by DOT occupation. Therefore, an SVP value for each OU had to be calculated. Each OU SVP value is simply the mean of the SVP values for the core DOT occupations.

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[18] One alternative, General Educational Development (GED), is inadequate because it does not clearly reflect all forms of training and experience.

Selection of SVP Cutoffs

After identifying the SVP level for each of the OUs, critical points on the SVP scale were identified that would be used to define groupings of OUs that represented different levels of education and training. Five levels of education and training were deemed appropriate. More levels would make the structures too complicated to use manually and too difficult for clients to interpret; fewer levels would make the structures so broad that not much differentiation would be achieved.

The SVP scale points that were used to define the five strata were chosen on the basis of (a) the nature of the distribution of SVP "scores" across OUs (remember that for all OUs comprising more than one DOT code, the SVP is the mean of a number of DOT code ratings), (b) the requirement to identify five zones that contained approximately the same number of occupations, and (c) the substantive meaning of the SVP scale itself.

Users of the DOT are accustomed to seeing integer values for SVP. An initial segmentation of the SVP distribution included fractional boundary SVP values (e.g., Job Zone 1 contained all OUs with SVP values of 7.5 and above). Although fractional values make fine statistical sense, a pilot test of the system showed that they did not translate well to the operational setting. To maximize the familiarity of the strata boundaries to system users, a new stratification of OUs was conducted using integers as SVP boundary. In addition, the Job Zones were ordered such that Job Zone 1 contains those OUs having the lowest values of SVP and Job Zone 5 the highest.

Thus, the five Job Zones present the client with five broad groupings of OUs that may be explored. Descriptions of the five operational strata (i.e., Job Zones) and their SVP boundaries are provided below. The actual definitions that users see for each Job Zone are provided in the O*NET Ability Profiler Score Report (see Appendix). Sample OUs from each of the Job Zones are provided in Table 8.

Job Zone 1: 182 OUs {Boundary → mean SVP < 4.0}. This Job Zone represents the lowest level of educational and training preparation and includes occupations that require up to 3 months of training. It includes a large number of less complex service occupations as well as materials handlers and machine/equipment tenders or operators.

Job Zone 2: 265 OUs {Boundary → 4.0 ≤ mean SVP < 6.0}. This Job Zone includes occupations that are judged to require more than 3 months, but not more than one year of occupation specific training. It includes a large number of service positions, as well as clerical, maintenance, and operator positions.

Job Zone 3: 259 OUs {Boundary → 6.0 ≤ mean SVP < 7.0}. Occupations in this Job Zone require from one to two years of occupation-specific training. Many different kinds of technicians, administrative personnel, and skilled machine operators fall at this level.

Job Zone 4: 287 OUs {Boundary → 7.0 ≤ mean SVP < 8.0}. This Job Zone includes occupations that require more than two years, but not more than four, of specific training and education. A large number of professional and technical occupations fall in this category, as well as a broad range of supervisory and management positions.

Job Zone 5: 129 OUs {Boundary → 8.0 ≤ mean SVP}. This Job Zone represents the highest level of preparation and includes occupations that would require more than 4 years of specific education and training for achieving at least an average level of performance in the occupation. This would include most engineers, scientists, and high level professional positions, as well as directors/managers of scientific or professional personnel and occupations that require a very high level of technical skill (e.g., airline pilot, concert musician).

Table 8
The Five Job Zones with Sample Occupational Units and their SVP Values

Job Zone 1: Mean SVP < 4.0 (*k* = 182 OUs)

OU Code	SVP	OU Title
49017	2.33	Counter and Rental Clerks
57311A	2.00	Couriers and Messengers
63021	2.00	Parking Enforcement Officers
65005	2.33	Bartenders
66099D	3.00	Phlebotomists
68021	2.00	Ushers, Lobby Attendants, and Ticket Takers
79999N	2.00	Yard Workers, Private Household
87711	3.00	Highway Maintenance Workers
93917A	3.00	Solderers
98705	1.00	Refuse and Recyclable Material Collectors

Job Zone 2: 4.0 ≤ Mean SVP < 6.0 (*k* = 265 OUs)

OU Code	SVP	OU Title
34058E	5.50	Motor Racers
43008	5.50	Sales Agents, Real Estate
63002A	5.75	Fire Inspectors
63032	4.25	Sheriffs and Deputy Sheriffs
66014	5.00	Psychiatric Aides
79017D	4.00	Aquarium Tank Attendants
85128B	3.80	Oilers
87108	5.33	Drywall Installers
87905	5.00	Blasters and Explosives Workers
97944	4.67	Crane and Tower Operators

Table 8 (continued)
The Five Job Zones with Sample Occupational Units and their SVP Values

Job Zone 3: 6.0 ≤ Mean SVP < 7.0 (*k* = 259 OUs)

OU Code	SVP	OU Title
21511E	6.50	Personnel Recruiters
32908	6.00	Dental Hygienists
39999C	6.00	City Planning Aides
53702	6.00	Court Clerks
55102	6.00	Legal Secretaries
65021	6.60	Bakers, Bread and Pastry
79016	6.50	Animal Trainers
79999D	6.83	Farmers
87811	6.67	Glaziers
89999B	6.50	Wig Makers

Job Zone 4: 7.0 ≤ Mean SVP < 8.0 (*k* = 287 OUs)

OU Code	SVP	OU Title
15002	7.50	Postmasters and Mail Superintendents
21114A	7.83	Accountants
22135	7.50	Mechanical Engineers
31514	7.50	Vocational and Educational Counselors
34002D	7.00	Editors
43014A	7.00	Sales Agents, Securities and Commodities
61099A	7.50	Chefs and Head Cooks
87102E	7.00	Boat Builders and Shipwrights
89914D	7.00	Film Laboratory Technicians
97702J	7.00	Commercial Helicopter Pilots

Job Zone 5: 8.0 ≤ Mean SVP (*k* = 129 OUs)

OU Code	SVP	OU Title
15005A	8.50	College and University Administrators
22105C	8.00	Welding Engineers
22308	8.00	Landscape Architects
27108J	8.00	Industrial-Organizational Psychologists
27502	8.00	Clergy
32102J	9.00	Surgeons
32114B	8.00	Veterinarians
34051	8.00	Musicians, Instrumental
85999D	8.00	Gunsmiths
97508	8.00	Pilots, Ship

Client Identification of Appropriate Job Zones

One advantage of using SVP to begin the client/OU linkage is that users can explore (a) jobs that require a *current* level of occupation-specific training and education or (b) jobs that require an anticipated level of occupation-specific training and education level (i.e., a level they plan to achieve at some *future* date). The group of occupations that corresponds to the former exploration choice is labeled a "Current Job Zone," whereas the group of occupations that corresponds to the latter is labeled a "Future Job Zone."

The O*NET Ability Profiler Score Report (see Appendix) presents users with a definition of a Current Job Zone and a Future Job Zone. In addition, the Score Report describes how to choose the Job Zone that best fits users. Specifically, clients are instructed to ask themselves the following questions:

1. "Do I have the experience, education, and training to do the work for the occupations in this Job Zone?" (for a Current Job Zone)

   OR

   "Am I willing to get the experience, education, and training needed to do the work for the occupations in this Job Zone?" (for a Future Job Zone)

   AND

2. "Would I like to work in the occupations in this Job Zone?"

An affirmative response to both questions indicates identification of an appropriate Job Zone. A negative response to either question suggests other Job Zones should be examined.

In addition to describing how to explore occupations by selecting a Current Job Zone or a Future Job Zone, the O*NET Ability Profiler Score Report also provides a definition of each Job Zone. The definition describes the general or most representative level of Overall Experience, Education, and Job Training required by jobs within that Job Zone. In addition, the definition contains examples of jobs that constitute the Job Zone.

The flexibility to explore various Job Zones and to assume either current or future levels of education, training, and experience expands career exploration by permitting exploration of a wide range of occupational possibilities. For example, clients have the option to perform a certain amount of *"what if"* exploration (i.e., *what* occupations would open up, *if* the client reached a certain level of education and training). The "what if" speculations can then be tempered by using the client's ability profile to search for suitable occupations within the Job Zone. The Job Zones present clients with this option, thereby maximizing the capacity of the O*NET Ability Profiler and the other O*NET Career Exploration Tools to meet clients' needs.

Summary

The O*NET Career Exploration Tools provide clients with a highly flexible, informative vehicle for exploring the world of work. Using information about their individual attributes from any or all of the three O*NET Profilers (Ability, Interest, and Work Importance), clients are presented with the OUs that most closely correspond to their constellation of abilities, interests, and valued work outcomes. Determining the fit of a client's score profile to the score profiles of OUs assumes the presence of OU-specific profiles. This report described the process by which ability profiles were estimated for the 1,122 OUs within O*NET. In addition, the report detailed the process by which the most correspondent OUs are identified and how scores are calibrated to the original GATB norming sample and reported to the client.

Data from the GATB validity database and the *Dictionary of Occupational Titles* (DOT; U.S. Department of Labor, 1991a) were used to generate the ability profiles for the OUs. The specific steps discussed in the report were as follows:

- Reduction of DOT variables into seven principal components,
- Regression of GATB aptitude scores onto the seven DOT components,
- Identification of core DOT occupations for each OU, and
- Calculation of OU ability profiles as the mean of the core DOT occupations' profiles.

The DOT components were highly related to seven of the nine GATB aptitude scores (R^2 values ranging from about .56 to about .62); aptitudes F and M were less well predicted (R^2 values ranging from about .08 to about .13). The procedure for identifying core DOT occupations within each OU reduced the influence of outlying DOT occupations (those occupations possessing rather atypical ability profiles relative to other occupations in the OU).

The algorithm for determining correspondence between client and OU score profiles was also presented. Consistent with the preferences of vocational counselors, the algorithm uses the correlation coefficient as the index of correspondence. By using the correlation, the algorithm emphasizes similarity of profile shapes rather than levels when determining correspondence. A second correspondence index, Euclidean distance, is used with the O*NET Ability Profiler should a client's profile correlate equally with two or more OU profiles.

The O*NET Ability Profiler was calibrated to earlier GATB forms. The calibration ensures that scores on the O*NET Ability Profiler can be meaningfully interpreted relative to the available GATB forms (i.e., Forms A-D) and retains a linkage to the valuable GATB validity databases. The presentation of scores to clients was also discussed. The O*NET Ability Profiler Score Report provides the client with raw and percentile scores, as well as information about the five Job Zones and the OUs identified within each Job Zone that appear promising avenues for career exploration.

The O*NET assessment tools provide a key link between clients and the occupational information contained in O*NET. In the future, the O*NET OU structure will be modified to interface with the recently completed Standard Occupational Classification, which (at the most detailed level) embodies 810 occupational groupings. As the OU structure is crosswalked to the SOC occupational categorization, a similar process to that described in this report will need to be considered for generating SOC-specific ability profiles. The process could be as simple as averaging the OU profiles that constitute a given SOC category, but could also involve conducting the procedures described in this report at the SOC level. That is, the DOT occupations within each SOC category could be analyzed to determine that category's core DOT occupations. The estimated ability profiles from those core occupations could then be averaged to yield SOC-specific profiles.

Career exploration using the O*NET assessment tools is (and will continue to be) a dynamic process. By computerizing occupational information, O*NET provides a means for keeping pace with occupational changes. Crosswalking the O*NET OU structure onto the SOC will ensure DOL's occupational structure and data are timely and relevant for its clients. Similarly, the career exploration process—specifically, the process by which client abilities, interests, and desired job characteristics are assessed and matched to promising occupations for exploration—can be systematically monitored and updated to ensure maximal benefit to DOL's clients. O*NET assessment tools (of which the O*NET Ability Profiler is one) and client/occupation linkage procedures provide DOL's clients with a flexible, dynamic career exploration system that can retain its vitality in today's rapidly changing world of work.

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Appendix

The O*NET Ability Profiler Score Report

O*NET Ability Profiler™ Score Report

Name Joe Average (000000010) Test Date 1/26/2003

How can the Ability Profiler help you?

Recently, you took the Ability Profiler to learn more about your job-related abilities. This information can help you explore the world of work. With this knowledge you can identify and learn more about occupations that would give you the highest chances to use your abilities. You are much more likely to be satisfied with work that best uses your abilities.

Your Ability Profiler results will help you learn more about your strengths and areas where you might want to seek more education or training. You **should use** your results to explore the world of work by comparing your abilities to the abilities necessary for performing certain occupations. Your results **must not be used** for employment or hiring decisions. Employers, education programs, or other job-related programs should not use your results as part of a screening process.

This score report will help you better understand your Ability Profiler results and show you how to use them for career exploration and career development.

What information does the Ability Profiler provide?

The Ability Profiler measures nine abilities that can help you do well in most jobs. Look at the names of these abilities. You will recognize that you have developed some of these abilities, such as verbal and math skills, through your education.

You have developed other abilities, like form perception and finger dexterity, through your experiences and training. The Ability Profiler helps you identify your strongest abilities. Knowing your strongest abilities is very helpful when you are exploring careers. The nine abilities measured by the Ability Profiler are:

Verbal Ability: Verbal ability is understanding the meaning of words and using them correctly in good communication when you listen, speak, or write. This ability is measured by the *Vocabulary* exercise.

Arithmetic Reasoning: Arithmetic reasoning is an ability that uses several math skills and logical thinking to solve problems in everyday situations. It involves gathering and sorting through all information related to a problem, making educated guesses about how best to solve the problem, picking a likely way to solve it, and, then, explaining your decisions. This ability is measured by the *Arithmetic Reasoning* exercise.

Computation: Computation ability is using arithmetic operations of addition, subtraction, multiplication, and division to solve everyday problems involving numbers. This ability is measured by the *Computation* exercise.

Spatial Ability: Spatial ability is being able to form pictures of objects in your mind. It involves easily understanding how drawings represent real objects and correctly imagining

how parts fit together. It is an important ability for many artistic, engineering, architectural, and mechanical jobs. This ability is measured by the *Three-Dimensional Space* exercise.

Form Perception: Form perception is the ability to see details in objects, pictures, or drawings quickly and correctly. It involves noticing little differences in shapes of figures, shading, and lengths and widths of lines. It is an important ability for many inspection, quality control, and scientific jobs. This ability is measured by the *Object Matching* exercise.

Clerical Perception: Clerical perception is the ability to see details in written materials quickly and correctly. The material may be text or numbers on a page, in lists, or in tables. It involves noticing if there are mistakes in the text and numbers, or if there are careless errors in working math problems. Many industrial occupations call for clerical perception even when the job does not require reading or math. This ability is measured by the *Name Comparison* exercise.

Motor Coordination: Motor coordination is the ability for different parts of your body to work well together. For many jobs, it involves coordinating your eyes and hands or fingers to make quick, accurate, and precise movements. This ability is measured by the *Mark-Making* exercise.

Finger Dexterity: Finger dexterity is the ability to move your fingers skillfully and easily. It involves using your fingers to handle small objects quickly and accurately. This ability is measured by the combination of the *Assemble and Disassemble* exercises.

Manual Dexterity: Manual dexterity is the ability to move your hands skillfully and easily. It involves using your hands to place and turn objects quickly and accurately. This ability is measured by the *Place and Turn* exercise.

What is your Ability Profile?

These are your scores from the Ability Profiler. They are reported as percentiles, which range from 1 to 99. Percentiles show how you compare to a very large group, or sample, of other people who work in many different kinds of jobs across the country. For example, if you had a percentile score of 60, it would mean you scored the same as or higher than 60 out of 100 people who were in the nationwide sample. The average percentile score for any one of the abilities is 50. This means the average worker would score at the 50th percentile for that ability.

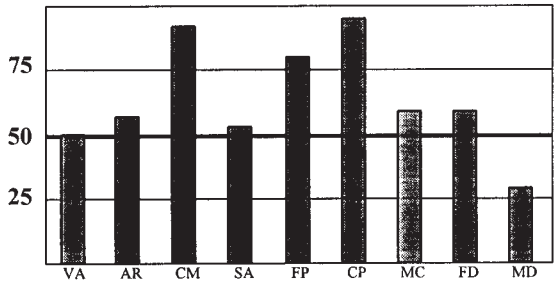
Look at your nine percentile scores, one for each of the nine abilities measured by the Ability Profiler. Check which ability has your highest score and second highest score. You might also want to note the ability with your lowest score. How much difference is there between your highest and lowest scores? Are the scores what you expected, or are you surprised by any of them?

Your percentile scores also are shown in a profile. The height of each bar represents your score for that ability. The 50th percentile is shown as the darkest line that crosses the bars. The dark line above it represents the 75th percentile, and the dark line below it shows the 25th percentile. You can look across the bars and easily see your scores in comparison to each other. You also can note your ability scores in relation to the scores of the people in the sample. Do this by looking at one of the lines — for the 25th, 50th, or 75th percentile — and see how far above or below that line your bar is.

Just so you will know how many items you answered correctly, other than on the dexterity abilities, look next to your percentile scores. You

will see the number you got correct out of the total number of questions in each subtest.

Your Ability Profile – Percentile Scores



Your Ability Percentile Scores		Your No. Correct / Total No. Questions
Verbal Ability	[50]	[13 / 19]
Arithmetic Reasoning	[57]	[14 / 18]
Computation[a]	[92]	[32 / 40]
Spatial Ability	[53]	[15 / 20]
Form Perception[a]	[80]	[29 / 42]
Clerical Perception[a]	[95]	[76 / 90]
Motor Coordination	[59]	[72 / 130]
Finger Dexterity	[59]	---
Manual Dexterity	[29]	---

[a] The percentile scores for these abilities include a deduction for wrong answers.

What occupations are linked with your Ability Profile?

Now that you have learned about your Ability Profile and have seen how your different abilities compare with one another, you are ready to find the occupations that are linked with your Ability Profile.

To help you identify occupations that can use your pattern of abilities, your Ability Profile was compared to the ability profiles of occupations. Your Ability Profile is linked to a set of occupations that has been grouped into five Job Zones. Each Job Zone contains occupations that require the same amount of education, training, and experience. Knowing your Job Zone can help you focus your career exploration.

This score report provides five occupational lists based on your Ability Profile. There is one list for each of the five Job Zones. Read below to find out about the Job Zones and how to pick your Job Zone. **To explore occupations on this score report, you will need to know your Job Zone as well as your Ability Profile.**

(*If you have already picked a Job Zone, turn to pages 7 and 16 and write your Job Zone(s) in the spaces provided*)

What is a Job Zone?

A Job Zone is a group of occupations that are similar in these ways:

- How most people get into the job.
- How much overall experience people need to do the job.
- How much education people need to do the job.
- How much on-the-job training people need to do the job.

In other words, occupations within a Job Zone require a similar level of preparation. By picking a Job Zone you will be able to narrow your career search.

The five Job Zones are:	
Job Zone 1 --	Occupations that need *Little* or *No* preparation
Job Zone 2 --	Occupations that need *Some* preparation
Job Zone 3 --	Occupations that need *Medium* preparation
Job Zone 4 --	Occupations that need *Considerable* preparation
Job Zone 5 --	Occupations that need *Extensive* preparation

To help you explore occupations, you can think about Job Zones in two ways:

Your *Current* Job Zone and your *Future* Job Zone.

Current Job Zone: If you want to explore occupations at your *current* "level of preparation," choose the Job Zone that best matches the amount of training, education, and experience you have now. This is your Current Job Zone with jobs that need the knowledge and skills you have right now.

Future Job Zone: If you want to explore occupations based on your *future* "level of preparation," — for example, after you finish high school — choose the Job Zone that best matches the training, education, and experience you expect to have in the future. This is your Future Job Zone with jobs that you will have the knowledge and skills to do in the future.

Job Zone Definitions

To get a better idea of what they mean, read the following Job Zone definitions:

Job Zone 1: Little or No Preparation Needed

Overall Experience: No previous work-related skill, knowledge, or experience is needed for these occupations. For example, a person can become a general office clerk even if he/she has never worked in an office before.

Education: These occupations may require a high school diploma or GED certificate. Some may require a formal training course to obtain a license.

Job Training: Employees in these occupations need anywhere from a few days to a few months of training. Usually, an experienced worker could show you how to do the job.

Examples: These occupations involve following instructions and helping others. Examples include bus drivers, forest and conservation workers, general office clerks, home health aides, and waiters/waitresses.

Job Zone 2: Some Preparation Needed

Overall Experience: Some previous work-related skill, knowledge, or experience may be helpful in these occupations, but usually is not needed. For example, a drywall installer might benefit from experience installing drywall, but an inexperienced person could still learn to be an installer with little difficulty.

Education: These occupations usually require a high school diploma and may require some vocational training or job-related course work. In some cases, an associate's or bachelor's degree could be needed.

Job Training: Employees in these occupations need anywhere from a few months to one year of working with experienced employees.

Examples: These occupations often involve using your knowledge and skills to help others. Examples include drywall installers, fire inspectors, flight attendants, pharmacy technicians, retail salespersons, and tellers.

Job Zone 3: Medium Preparation Needed

Overall Experience: Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.

Education: Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree. Some may require a bachelor's degree.

Job Training: Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers.

Examples: These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include dental assistants, electricians, fish and game wardens, legal secretaries, personnel recruiters, and recreation workers.

Job Zone 4: Considerable Preparation Needed

Overall Experience: A minimum of two to four years of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified.

Education: Most of these occupations require a four-year bachelor's degree, but some do not.

Job Training: Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or vocational training.

Examples: Many of these occupations involve coordinating, supervising, managing, or training others. Examples include accountants, chefs and head cooks, computer programmers, historians, and police detectives.

Job Zone 5: Extensive Preparation Needed

Overall Experience: Extensive skill, knowledge, and experience are needed for these occupations. Many require more than five years of experience. For example, surgeons must complete four years of college and an additional five to seven years of specialized medical training to be able to do their job.

Education: A bachelor's degree is the minimum formal education required for these occupations. However, many also require graduate school. For example, they may require a master's degree, and some require a Ph.D., M.D., or J.D. (law degree).

Job Training: Employees may need some on-the-job training, but most of these occupations assume that the person will already have the required skills, knowledge, work-related experience, and/or training.

Examples: These occupations often involve coordinating, training, supervising, or managing the activities of others to accomplish goals. Very advanced communication and organizational skills are required. Examples include lawyers, instrumental musicians, physicists, counseling psychologists, and surgeons.

Which Job Zone suits you best?

To help you decide if a Job Zone fits you, you might ask yourself:

1. "Do I have the experience, education, and training needed to do the work for the occupations in this Job Zone?" (*Current* Job Zone)
2. "Am I willing to get the experience, education, and training needed to do the work for the occupations in this Job Zone?" (*Future* Job Zone)
3. "Would I like to work in at least some of the occupations in this Job Zone?"

If you answered "yes" to these questions, then you have found your Job Zone(s).

If you answered "no" to these questions, you may want to look at the other Job Zone definitions to find one better suited to your situation.

Write the Job Zone(s) you picked in the spaces below **and in the box on page 16**.

Your *Current* Job Zone: _____ (1, 2, 3, 4, or 5)

Your *Future* Job Zone:_____ (1, 2, 3, 4, or 5)

Compare your picks with the Job Zone occupations based on your Ability Profiler results. Read the next section to find out how you can use the information you have.

Exploring Careers Using Your Abilities and Your Job Zone

Printed on the following pages are some occupations within each of the Job Zones. These are occupations that could make the best use of your abilities.

Remember, each occupation within a Job Zone requires about the same level of education and training. The lists start with the occupations that best match your ability profile. These lists are meant as a starting place. Follow the steps below to begin your career exploration.

1. Look at the list of occupations for your Job Zone.

Based on your choice of Job Zone, these are some of the occupations that may allow you to best use your abilities. By choosing this Job Zone, you have indicated that these occupations would best use your current knowledge and skills or your future knowledge and skills. Do you see any occupations that you would like to find out more about? **Once you have selected occupations to explore, list them in the spaces provided on page 16.**

2. Find out more about the occupations.

When you have selected occupations to explore, you can use O*NET™ OnLine, http://www.onetcenter.org, to find out such information as:

- the types of activities that are performed in these occupations and
- the skills, abilities, education, training, and experience that are needed for them.

3. Still want more?

If you don't like the occupations listed in your Job Zone and you don't want to explore them, you have several choices:

- You can review the Job Zone definitions to make sure that you have chosen the Job Zone that best matches your current or future situation. If you decide that another Job Zone is better for you, then review the occupations that are listed for that Job Zone. Do any of those occupations appeal to you? If so, you can explore them in O*NET OnLine.

4. Want to know about a particular occupation not on your list?

If you want to learn more about a particular occupation not on your list:

- **Find the occupation using the search capabilities in O*NET OnLine (http://online.onetcenter.org).**
- Check the skills, abilities, education, training, and experience information that are needed for the **occupation**, in the O*NET OnLine reports. Do you currently have or expect to have the needed skills, abilities, education, training, and experience for that occupation? If you do, this occupation may be a good one to explore.
- Talk to someone working in the **occupation** to find out what it is really like.

(*You may want to take one or more of the other O*NET Career Exploration Tools to see if the results show that your interests and work values support further consideration of this occupation.*)

Selected Job Zone 1 Occupations
(Little or No Preparation Needed)

O*NET-SOC #	O*NET-SOC Title
43-5071.00	Shipping, Receiving, and Traffic Clerks*
43-3061.00	Procurement Clerks*
43-9061.00	Office Clerks, General*
43-9051.02	Mail Clerks, Except Mail Machine Operators and Postal Service*
43-5111.00	Weighers, Measurers, Checkers, and Samplers, Recordkeeping*
43-4041.01	Credit Authorizers*
43-5041.00	Meter Readers, Utilities*
41-2011.00	Cashiers*
51-3093.00	Food Cooking Machine Operators and Tenders*
43-5081.02	Marking Clerks*
43-4041.02	Credit Checkers*
41-2021.00	Counter and Rental Clerks*
51-6061.00	Textile Bleaching and Dyeing Machine Operators and Tenders*
43-4171.00	Receptionists and Information Clerks*
43-4121.00	Library Assistants, Clerical*
51-9021.00	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders*
51-9023.00	Mixing and Blending Machine Setters, Operators, and Tenders*
51-3091.00	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders*
43-4111.00	Interviewers, Except Eligibility and Loan*
53-6031.00	Service Station Attendants*
41-9011.00	Demonstrators and Product Promoters*
37-2012.00	Maids and Housekeeping Cleaners*

* Strong match

Selected Job Zone 2 Occupations (Some Preparation Needed)	
O*NET-SOC #	**O*NET-SOC Title**
43-4021.00	Correspondence Clerks*
43-9081.00	Proofreaders and Copy Markers*
43-3021.02	Billing, Cost, and Rate Clerks*
25-4031.00	Library Technicians*
43-9041.02	Insurance Policy Processing Clerks*
43-4031.02	Municipal Clerks*
43-4151.00	Order Clerks*
41-9022.00	Real Estate Sales Agents*
43-9041.01	Insurance Claims Clerks*
41-4011.04	Sales Representatives, Mechanical Equipment and Supplies*
23-2093.01	Title Searchers*
43-4061.02	Welfare Eligibility Workers and Interviewers*
33-2021.01	Fire Inspectors*
43-5061.00	Production, Planning, and Expediting Clerks*
43-4131.00	Loan Interviewers and Clerks*
47-5051.00	Rock Splitters, Quarry*
41-4011.03	Sales Representatives, Electrical/Electronic*
21-1093.00	Social and Human Service Assistants*
27-3011.00	Radio and Television Announcers*
43-4161.00	Human Resources Assistants, Except Payroll and Timekeeping*
43-4051.01	Adjustment Clerks*
41-4012.00	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products*
43-4181.01	Travel Clerks*
43-4011.00	Brokerage Clerks*
41-4011.01	Sales Representatives, Agricultural*

* Strong match

Selected Job Zone 3 Occupations (Medium Preparation Needed)	
O*NET-SOC #	**O*NET-SOC Title**
29-2071.00	Medical Records and Health Information Technicians*
27-3091.00	Interpreters and Translators*
19-3041.00	Sociologists*
23-2093.02	Title Examiners and Abstractors*
15-1051.00	Computer Systems Analysts*
41-4011.06	Sales Representatives, Instruments*
13-1031.02	Insurance Adjusters, Examiners, and Investigators*
13-2052.00	Personal Financial Advisors*
13-1071.01	Employment Interviewers, Private or Public Employment Service*
41-3021.00	Insurance Sales Agents*
13-1071.02	Personnel Recruiters*
41-3031.02	Sales Agents, Financial Services*
13-1041.04	Government Property Inspectors and Investigators*
13-1072.00	Compensation, Benefits, and Job Analysis Specialists*
13-1011.00	Agents and Business Managers of Artists, Performers, and Athletes*
21-1092.00	Probation Officers and Correctional Treatment Specialists*
13-1041.02	Licensing Examiners and Inspectors*
13-1041.01	Environmental Compliance Inspectors*
41-1012.00	First-Line Supervisors/Managers of Non-Retail Sales Workers*
41-1011.00	First-Line Supervisors/Managers of Retail Sales Workers*
27-2023.00	Umpires, Referees, and Other Sports Officials*
41-4011.02	Sales Representatives, Chemical and Pharmaceutical*
27-3012.00	Public Address System and Other Announcers*
43-1011.01	First-Line Supervisors, Customer Service*
13-1022.00	Wholesale and Retail Buyers, Except Farm Products*

* Strong match

Selected Job Zone 4 Occupations (Considerable Preparation Needed)	
O*NET-SOC #	**O*NET-SOC Title**
19-3091.02	Archeologists*
13-2021.01	Assessors*
19-3091.01	Anthropologists*
19-3051.00	Urban and Regional Planners*
15-2031.00	Operations Research Analysts*
13-1032.00	Insurance Appraisers, Auto Damage*
27-3041.00	Editors*
15-1071.01	Computer Security Specialists*
19-3021.00	Market Research Analysts*
19-3031.01	Educational Psychologists*
13-2031.00	Budget Analysts*
13-2041.00	Credit Analysts*
13-2071.00	Loan Counselors*
13-2072.00	Loan Officers*
13-2021.02	Appraisers, Real Estate*
15-1061.00	Database Administrators*
53-6051.02	Public Transportation Inspectors*
13-2053.00	Insurance Underwriters*
27-3043.02	Creative Writers*
27-3022.00	Reporters and Correspondents*
13-2011.01	Accountants*
11-3031.02	Financial Managers, Branch or Department*
13-1051.00	Cost Estimators*
11-9131.00	Postmasters and Mail Superintendents*
15-1031.00	Computer Software Engineers, Applications*

* Strong match

Selected Job Zone 5 Occupations (Extensive Preparation Needed)	
O*NET-SOC #	**O*NET-SOC Title**
11-9041.00	Engineering Managers*
19-3032.00	Industrial-Organizational Psychologists*
27-3042.00	Technical Writers*
19-3094.00	Political Scientists*
11-3021.00	Computer and Information Systems Managers*
15-2011.00	Actuaries*
23-1022.00	Arbitrators, Mediators, and Conciliators*
23-1021.00	Administrative Law Judges, Adjudicators, and Hearing Officers*
41-9031.00	Sales Engineers*
11-3031.01	Treasurers, Controllers, and Chief Financial Officers*
13-2051.00	Financial Analysts*
11-1011.02	Private Sector Executives*
11-9033.00	Education Administrators, Postsecondary*
27-2012.03	Program Directors*
25-1052.00	Chemistry Teachers, Postsecondary*
25-1054.00	Physics Teachers, Postsecondary*
25-1125.00	History Teachers, Postsecondary*
25-1043.00	Forestry and Conservation Science Teachers, Postsecondary*
25-1041.00	Agricultural Sciences Teachers, Postsecondary*
25-1042.00	Biological Science Teachers, Postsecondary*
25-1061.00	Anthropology and Archeology Teachers, Postsecondary*
25-1121.00	Art, Drama, and Music Teachers, Postsecondary*
25-1124.00	Foreign Language and Literature Teachers, Postsecondary*
25-1123.00	English Language and Literature Teachers, Postsecondary*
25-1021.00	Computer Science Teachers, Postsecondary*

* Strong match

What if you still don't have a clear picture of careers that fit with your abilities?

The Ability Profiler is only one of the tools you can use to help in your career search. Other O*NET Career Exploration Tools are listed in the next section. If you feel you don't have a clear direction yet, you can try a different route.

Your Ability Profile tells just some of the important information about you that can be used to explore the world of work. Other information you can use includes your work values and your interests.

In addition, you may have special skills or talents that you might want to think about when exploring careers. For example, you might work really well with people or you might be very outgoing. You may want to find a career that takes advantage of these important skills.

Also, you might have special knowledge you learned from hobbies or other activities that is important for certain jobs. You may want to consider this when looking at different occupations.

Maybe you know someone who works in an occupation that seems interesting to you. You can talk with the person to find out what the job is really like.

How can you use your Ability Profiler with other O*NET Career Exploration Tools?

You can use this score report with other score reports for the Interest Profiler and Work Importance Locator or Work Importance Profiler. If you put the score reports together, you can get a better idea of the kinds of careers you might find satisfying and rewarding. If you pick an occupation that fits with your interests and abilities, you will most likely find the job enjoyable and will perform well.

The O*NET Career Exploration Tools

As you explore your career options, you should know that other tools are available to help you. The **Ability Profiler** is just one of five tools that make up the O*NET Career Exploration Tools. The other tools are:

- The **Interest Profiler** — helps you find out what your work-related interests are. It can help you identify occupations that you may find interesting.
- The **Computerized Interest Profiler** — is similar to the paper-and-pencil Interest Profiler, except that you answer and score the questions on a computer.
- The **Work Importance Locator** — helps you decide what is important to you in a job. It can help you identify occupations that you may find satisfying.
- The **Work Importance Profiler** — is similar to the Work Importance Locator, except that you answer and score the questions on a computer.

These tools give you three important pieces of information that are valuable to you when exploring careers:

1. what is important to you in your world of work,
2. what you can do well, and
3. what you like to do.

You may use the tools separately or together. You can use them to identify occupations in the world of work that you may want to explore.

O*NET Occupations Work Page

Use this page to list the occupations you have picked to explore.

If you haven't already done so, copy your Job Zone(s) from page 7 in the box below.

Your ***Current*** **Job Zone**: _____	Your ***Future*** **Job Zone**: _____

As you look at the lists of occupations that are linked with your Ability Profile — those occupations that could make the best use of your abilities — write the occupations you want to explore below. You can list occupations for both your Current Job Zone and your Future Job Zone. Be sure to add to the list below when you pick other occupations to explore.

Write Below the O*NET Occupations You Have Picked to Explore:

	O*NET-SOC#	O*NET-SOC Title
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____
11.	_____	_____
12.	_____	_____