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Welcome Editorial From the Incoming Co-Editor/Editor-in-Chief

It is my honor to serve as the incoming editor for the VECAP *Journal*. I have been a VECAP member since I was in graduate school, I have published several articles in the VECAP *Journal*, and have had the opportunity to serve in several leadership positions in the organization, most recently as the communications committee chair. I am consistently impressed with the innovation, dedication, and professionalism of the people involved with VECAP. When the opportunity to serve as the incoming editor came up, it was an easy choice for me to say “yes.”

As the incoming editor, I am impressed with the current policies and procedures of the *Journal*. Dr. Steven Sligar has positioned the *Journal* for success by establishing a regular publication schedule, overseeing a timely and thorough review process, and creating multiple submission options beyond a full-length research article. His leadership has been transformative and will have a lasting positive impact on the *Journal* and its readership. Thank you, Dr. Sligar.

As the incoming editor, I want to use this opportunity to share my goals for the *Journal* during my term. I am dedicated to keeping the *Journal* healthy, modern, and appealing to both authors and readership. To do that, I have established two priorities:

Increase submissions to the VECAP Journal

The VECAP *Journal* sits at the nexus between researchers and practitioners. Thus, a regular publication schedule is important for keeping the field up to date and is an important membership benefit. However, it can be difficult for small publications like the VECAP *Journal* to maintain a regular schedule for publication. The VECAP *Journal* is currently published at a rate of two issues per year. As editor, I intend to maintain that schedule so readers are predictably getting the newest information and so authors can have confidence that their work will be published in a timely manner. However, as with many specialty journals, submissions can sometimes be limited. Thus, a critical part of meeting this priority will be increasing the number of submissions to the *Journal*.

As incoming editor, I hope to increase submissions to the VECAP *Journal* by (a) recruiting authors who publish or present content that would be of interest to VECAP readership; (b) continuing submission categories that are friendly to non-professors/non-researchers such as white papers and test reviews; (c) working towards increasing the findability and visibility of published work by making plans to assign digital object identifiers to articles and providing full-text articles on the VECAP website; and (d) continuing to be responsive to authors throughout the review process.

Maintain high quality Journal content

Having more submissions is not an end in itself. As editor, another goal is to continue to publish high-quality information that is readable and usable by our journal’s readership. As editor, I will maintain this value by utilizing a well-rounded group of reviewers who are well-positioned to evaluate articles based on their originality, quality, and contribution to the field. Additionally, I will invite guest reviews to increase diversity and perspectives among the consultant reviewer pool. I also plan to work collaboratively with authors, especially those who are new to the publication process, as their work

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moves through the peer-review process. A supportive relationship between the editor and authors will encourage submissions from authors with wide ranging backgrounds, experiences, and training.

I am excited by the opportunity to serve VECAP and the field. Please do not hesitate to contact me with any questions related to the *Journal*. Please take care and I hope to interact with you very soon.

Submitted: Amanda McCarthy, EdD, CRC, CVE, LCPC, PVE

Editor Note: Dr. Mike McClanahan's article, *Anybody Can Do It With the Right Tools: It Takes Real Skill to Do It With the Wrong Tools* was presented at the 17th *National Forum on Issues in Vocational Assessment*, October 25–27, 2017, in Atlantic Beach, NC, and is published in this issue for the first time.

John Banks' article, *A Technology Based ADA Physical Demands Pre-Employment/Post-Offer Assessment Tool for Industry*, was first published in R. Daniel (ed.) *The Issue Papers: Thirteenth National Forum on Issues in Vocational Assessment*, April 25-29, 2007, Auburn AL., 99-106. The article is reprinted in this journal with the addition of the reference section, which was omitted from the original publication. The content is the same but the article has been re-formatted to meet APA 7th edition standards.

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1 - Article

Vocational Evaluation and Career Assessment Professionals Journal

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Anybody Can Do it with the Right Tools; It Takes Real Skill to Do It With the Wrong Tools

Michael McClanahan

Abstract

This is practitioner-based information that is intended to provide information regarding the vocational evaluation process. A brief history of vocational evaluation as a science is presented followed by a model that can be used as the framework for the vocational evaluation process in forensic settings. Domains to be tested are identified, and instruments and processes to collect data for each of the domains are included. Issues that drive the selection of tools are discussed. Finally, a case study is offered for further discussion.

Keywords
vocational evaluation, forensic evaluation, vocational evaluation process

History of Vocational Evaluation

The profession of vocational evaluation is a 20th century phenomenon (Hursh & Kerns, 1988). The practice of vocational evaluation, however, can be traced as far back as 2200 B.C. when the ancient Chinese invented an aptitude test for use with government personnel (Rosenberg, 1973). An earlier "rough draft" of vocational evaluation, noted by Pruitt (1976), can be found in biblical times in the Book of Judges, wherein Gideon is instructed to select soldiers based on a single observation. When the prospective soldiers were allowed to drink water, Gideon was instructed to select only those who "lap like dogs" and reject those who use their hands to cup the water and drink. The more seasoned soldiers would lap the water, keeping their eyes up and their hands on their weapons.

More recently, and perhaps setting the benchmark for the beginning of vocational evaluation as a formalized science, is the work of Hugo Munsterberg, an industrial psychologist. Early in the 20th century, Munsterberg was charged with the responsibility of assisting the Boston Railway Company with selecting new personnel. He developed what we now refer to as a "work sample" in the form of a simulated streetcar operator's control panel. Munsterberg's work served as a precursor to formalized work samples that proved to be one of the first approaches to vocational evaluation (Hursh & Kerns, 1988). Moving on in time to the 1960s, we began to see the development of multiple work sample

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systems, including the Jewish Employment Vocational Service (JEVS) work sample system, the Singer System, and Valpar. Vocational evaluations during this era were labor intensive, expensive, and time-consuming. The work sample systems required maintenance and an inventory of supplies. Further, the systems approach was commonly augmented by psychometric testing.

As a remedy to the issues with work samples and in concert with the availability of new information, the Vocational Diagnosis and Assessment of Residual Employability (VDARE) concept was born in the early 1980s. The VDARE was unique in that it did not require face-to-face interaction, using an analysis of past relevant work and documentation of functional limitations (Sink & Field, 1981). It triggered a return to what Nadolsky (1971) termed “the micro-analytic approach” to vocational evaluation and was the driving logic behind the proliferation of computer systems and software in the 1980s and 1990s (McClanahan, 1994). In a sense, the rebirth of the Worker Trait Factor approach to vocational evaluation was reborn when computers found their way into society and into vocational evaluators’ practice.

Worker Trait Factor Approach to Vocational Evaluation

The worker trait factor approach to the assessment of jobs and workers is the basis for most of the computerized job search programs. The Department of Labor databases, a small part of which is contained in the Dictionary of Occupational Titles (DOT), include massive data sets on each job that exists in significant numbers in our national economy. The information on jobs compiled by the U.S. Department of Labor (DOL) includes 20 physical demand factors, 14 environmental factors, the general educational development required for each job in three broad categories, the specific vocational preparation (duration and type) required for each job, 11 critical vocational aptitudes, interests in 12 “*Guide to Occupational Exploration*” (GOE) classifications, and 11 temperaments.

The most widely accepted vocational evaluation method for assessing persons with disabilities is the worker-trait factor approach. The theoretical basis for this approach is that one can assess the traits of the worker individually, then add them up, and the sum of the component parts will be equal to the whole. This procedure has a number of advantages, perhaps the most distinguishing of which is that it can be used as an inclusive model for use of other approaches to assessment. Other advantages include the fact that it directly relates to the majority of databases that we access in vocational settings, has a common language and nomenclature, has at least a 60-year history, and can serve as the framework by which a number of employment-related services can be structured. The primary disadvantage is that the expert can become so enamored with measuring each of the individual traits (trees) that the client (forest) becomes forgotten. A valued characteristic of this approach is that it results in quantifiable information that ties directly into the DOL massive databases. These databases contain the same type of information on the composition of jobs that should be collected about the evaluee. This feature, having quantifiable information across similar dimensions for both individuals and jobs, spawned the development and use of computers in vocational evaluation that began in the 1980s. It makes sense to use the same data so as to facilitate the evaluee-to-job(s) “match.” To obtain the data specific to the evaluee’s worker traits (the data already exists for more than 12,000 jobs), we evaluate each factor by testing, analyzing past relevant work, analyzing educational and medical records, and various other means. The process then becomes one of selecting jobs by taking the evaluee’s profile and comparing it to the 12,000+ job databank.

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The Dictionary of Occupational Titles

The Dictionary of Occupational Titles (DOT) is at the same time the most maligned and invaluable job-related resource available today in multiple settings, and most particularly Social Security vocational evaluation testimony. The value of it is in terms of its magnitude and specificity. It contains narrative descriptions of more than 12,000 jobs, quantifiable information with respect to exertional and skill categories, GOE codes, and the reasoning, math, and language levels of each job. In addition, there are multiple other factors associated with each job that are not included in the print version of the DOT that are available via computer programs. These include 20 physical demand factors, 14 environmental factors, 11 critical vocational aptitudes, 11 temperaments, census codes, Materials, Products, Subject Matter, and Services (MPSMS) codes, and Worker Field codes, to name a few.

The shortcomings of the DOT have gotten far more press as of late than the benefits. These include the following.

- It is outdated. The most recent revision to the 4th Edition, print version, was in 1991. The Department of Labor, however, continued to update the DOT database for at least 10 years after the last revision. The problem is that many of the jobs were last updated in 1977. Many new jobs are not included, and outdated jobs are not purged.
- The Department of Labor conducted at least three job analyses on each job and may not be representative of how the job is performed on a national or local level.
- The "averaging" of job factors results in a document that might be considered "hypothetical." Take, for example, the job of Cashier, Self-Service Gasoline #211.462-010. This job is listed as "light" by the DOT. It is possible that two job analysts observed workers who were required to unload trucks and rated the job as medium, and the third analyst saw the job as sedentary, noting the worker simply received payment and made change. This would lead to the DOT description of the job as light, despite the fact that *not one observer rated it at the light level.* This process of averaging is used for every worker trait factor found in the Department's databases.
- It has been estimated that there are more than 30,000 data entry errors in the DOT. One such example might include the classification of Cook, Fast Food #313.374-010, described as Medium, Skilled (SVP=5) work. The exertional category is appropriate, but the skill level, one that would require specific vocational preparation of six months to one year is clearly excessive. A task analysis from the DOT narrative job description is indicative of a job similar to Cook Helper #317.687-010, a Medium, Unskilled job (SVP=2).
- The DOT does not provide incidences of jobs at either the local or national level. There are other sources for these data, but it remains an inexact process and there is disagreement as to the steps in the process.
- The DOT does not include any jobs with a G (General Learning Ability) level of 5 (lowermost 10% of the working population). This can be translated to mean no one with an IQ of 79 or lower can work.

The O*NET

Initially touted as a source that would cure all the ills of the DOT, the O*Net (https://www.onetonline.org/) has fallen short of expectation in the forensic and disability determination sector and is unlikely to ever serve as an adequate replacement, particularly when specific worker traits are required. It is an excellent resource for jobs, careers, and vocational

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exploration, but lacks the specificity of data needed in personal injury, Workers' Compensation, and Social Security Disability Determination processes. Although some experts might use O*NET information in Social Security hearings, further development is needed before it can be a suitable replacement for the DOT.

A Model for Forensic Vocational Evaluation

Nadolsky (1971) developed one of the first authoritative models for "Vocational Evaluation of the Disadvantaged" that includes multiple sequential steps for the vocational evaluation process. These steps include referral information, psychometric testing, work samples testing, situational assessment, and, ultimately, the identification of the "ideal job." During the time that this model served as a flow chart for vocational evaluations, the process required three to six weeks of daily interaction with the person being tested. In today's forensic market, vocational evaluations are accomplished much more quickly, typically completed in less than one full workday. In the present sample case that follows, less than four hours of face-to-face time with the person being assessed was required. Figure 1 might be considered a model for forensic evaluation with brief explanations of each step:

Figure 1

Flowchart for forensic evaluations

Referral with Referral Question
↓
Contract
↓
Referral Information
↓
Face to Face
↓
Scoring and Analysis
↓
Preliminary Report
↓
Information Request
↓
Report
↓
Update/Trial Preparation
↓
Trial/Settlement/ Closure/Follow-up

Referral with Referral Question. This is an inquiry from an attorney, usually a phone call, in which a thumbnail of the case is presented to the vocational evaluator with the ultimate question being "can you help me on this case?" It may come by email or letter, but these may be discoverable, so most attorneys use the phone.

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Contract. When agreement is reached, the vocational evaluator can forward an employment agreement that details the services to be provided, procedures involved, and fee structure. An appointment with the person to be tested is usually scheduled in this step.

Referral Information. Once agreement of terms is reached, the attorney (or referring source) will forward relevant information.

Face to Face. Interview and testing is conducted. Many times it is accomplished in the attorney's office, but can be performed in any setting that is appropriate for testing.

Scoring and Analysis. Tests are scored, records are reviewed, and a preliminary assessment is formulated.

Preliminary Report. Many attorneys request a preliminary report in verbal form, and some include it in the employment contract. The reason this step can be helpful is the reason for the next step.

Information Request. During the Preliminary Report, the vocational evaluator may identify something that is missing, or make a recommendation that helps fully evaluate the case. For example, in the case where the vocational evaluator has identified sequelae associated with head injury that has not yet been considered, a neuropsychological evaluation might be recommended.

Report. Once the needed information is available, a report is generated. This can be verbal or written.

Update/Trial Preparation. It is the norm rather than the exception that a significant period of time goes by after the report is generated and an actual trial is scheduled. Usually this period is months, but it can be a year or more. Any information that has developed in the interim between the report and the trial needs to be considered and adjustments made. Some retesting may be warranted as well.

Trial/Settlement/ Closure/Follow-up. In whatever fashion the case is resolved, it is time to close the case unless there are services that can continue to be provided. These services may include career counseling and guidance, help with job development and placement, or agency referral. In any case, follow-up with the person tested and/or the referral source can provide valuable feedback as to the efficacy of the work performed by the vocational evaluator.

Case Study

Mr. M. Lindsey is a 51-year-old male who was referred for an assessment of vocational prognosis by his attorney in relation to a motor vehicle collision that he suffered late in 2014. List of instruments and techniques used:
Vocational Interview
Visual Analog Pain Rating Scale Technique
Wide Range Achievement Test–Revision 4
Wechsler Abbreviated Scale of Intelligence–Second Edition
Sage Manual Dexterity Test

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Purdue Pegboard
Review referral information

Referral Information. Grady Hospital; Orthopaedic Specialists; Behavioral Medicine; Neurology Associates; Mayo Clinic; Pain Management Center; Employer's First Report of Injury*;* Physical Therapy, miscellaneous.

History of Onset/Background Information. Mr. Lindsey related a history of a December 2014 motor vehicle collision: "My 18-wheeler was hit by drunk driver." He suffered a loss of consciousness and was uncertain how long he was out. He was treated at the emergency room, but his problems continued with pain and dysfunction to the right side of his body and head. He was able to return to work "light duty" for a few weeks in a desk job, but he had no specific duties. A few weeks later he was referred to The Orthopaedic Clinic and was taken out of work. He was advised his "nerves are out of whack" and told that he would not be able to return to work as a truck driver.

Following multiple doctor visits, an MRI, and physical therapy, Mr. Lindsey remained in pain and was not returned to work. He went to have his CDL renewed and failed the exam. He eventually was referred to the Mayo Clinic and was diagnosed with severe chronic pain syndrome and fibromyalgia.

Mr. Lindsey's medical history, other than the above, includes nothing that would be expected to limit employability. He is on no medications as he has no insurance or money. He has gained almost 50 pounds since onset and attributed the weight gain to depression and an inability to exercise.

Claimant's Perception of Functional Abilities. Mr. Lindsey reports that he can reasonably handle 15 to 20 pounds. He alternates sitting and standing at 20- to 30-minute intervals, and he can walk a couple of blocks. He is able to drive. He has issues with vertigo, so he is unable to trust his balance. He avoids stooping, kneeling, crouching, and crawling as these activities are painful. Reach is limited by neck pain, and he has a loss of grip strength. He is right-handed.

Mr. Lindsey noted that his depth perception seems impaired since the wreck, and that he suffers with ongoing headaches, short-term memory loss, hyperphotosensitivity, and incoordination. He complained of problems with word selection when talking (expressive aphasia), he forgets conversations, and he has ringing in both ears. He denied any of these problems before the wreck.

Pain Assessment. Mr. Lindsey described ongoing pain in multiple areas. He rated the intensity of the pain using *the Visual Analog Scale Technique* (zero is no pain and 10 requires an immediate trip to the emergency room; see Table 1) for the 30 days prior to the evaluation.

Table 1

Visual Analog Scale for Mr. Lindsey

Location	At beginning /end of testing	Typical (past 30 days)	Worst (past 30 days)	Least (past 30 days)
Right lower extremity	4/9	5-7	9+	4
Back	4/9	7-8	9+	4
Neck	5/8	6-7	9+	5
Head	4/7	4-7	9+	4

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Emotional Adjustment. Mr. Lindsey admitted to struggling with depression and described feelings of worthlessness. He was seen by a psychiatrist and wants to continue when he has the funds or insurance.

Education/Training. Mr. Lindsey dropped out of high school in the eleventh grade. He obtained a GED in 1994 and completed one year of community college. He has no military experience.

Employment History. Mr. Lindsey has been a career truck driver for the past 25+ years.

Test Results

Academic. Mr. Lindsey's *Wide Range Achievement Test-Revision 4* (WRAT-4) scores (see table 2):

Table 2

WRAT-4 Scores for Mr. Lindsey

	Raw score	Standard score (SS)	Grade score
Word Reading (WR)	57	93	11.9
Sentence Comprehension (SC)	47	92	11.9
Spelling (S)	39	90	10.6
Math Computation (MC) Reading Composite (RC)*	34 185	90 90	7.0 11.7

* Reading Composite Raw Score = WR SS + SC SS

Intelligence. The Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II) is an IQ test designed to assess specific and overall cognitive capabilities. It is a battery of four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning. In addition to assessing general, or Full Scale, intelligence, the WASI-II is designed to provide estimates of Verbal and Performance intelligence consistent with other Wechsler tests. Specifically, the four subtests comprise the full scale and yield the Full Scale IQ (FSIQ-4). The Vocabulary and Similarities subtests are combined to form the Verbal Scale and yield a Verbal IQ (VIQ) score, and the Block Design and Matrix Reasoning subtests form the Performance Scale and yield a Performance IQ (PIQ) score. Mr. Lindsey demonstrated a Verbal Comprehension score of 95, Perceptual Reasoning 94, for a Full Scale of 94, which is in the Average range.

Vocational Aptitudes. Aptitudes are the capacities or specific abilities that an individual must have in order to learn to perform a given work activity. For this analysis, Mr. Lindsey's previously referenced academic and IQ scores, the Purdue Pegboard, and selected components from the Sage Vocational Aptitude Battery were considered. His scores are compared to competitively employed workers and presented in DOL's classification system in table 3.

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Table 3

Comparison of Scores

Aptitude	Percentile Ranking	Normative Comparison
General Learning	34-66%	average
Verbal	34-66%	average
Numerical	34-66%	average
Spatial	34-66%	average
Form Perception	34-66%	average
Clerical Perception	34-66%	average
Motor Coordination	0-10%	significantly below average
Finger Dexterity	0-10%	significantly below average
Manual Dexterity	0-10%	significantly below average

Vocational Appraisal

[Author Note: The *Vocational Appraisal* section includes a recap of the evaluation, analysis of test scores, and a summary of the relevant medical documentation. For this case study, the analysis of test scores is presented followed by the recommendation for a neuropsychological evaluation. The conclusion reached was that Mr. Lindsey is incapable of employment.]

It is noteworthy that the medical record is replete with many of the symptoms that Mr. Lindsey described during the present evaluation that may be sequelae of brain injury, and the precipitating event (i.e., motor vehicle collision) is commonly associated with brain injury. Specifically, the symptoms include psychological changes, short-term memory loss, hyperphotosensitivity, incoordination, vertigo/balance problems, tinnitus, expressive aphasia, and visual changes. A neuropsychological evaluation is required for diagnosis and is recommended.

Present testing resulted in reasonable scores given Mr. Lindsey's reported history, and there is good consistency for validation purposes. He has a GED with one year of community college and demonstrated achievement scores commensurate at the 11.9 in Word Reading and Sentence Comprehension. Spelling performance is at the 10.6 grade level, with Math Computation at 7.0. The multigrade disparity among the scores, combined with average range IQ scores, is suggestive of a mild learning disability; further testing is required for diagnostic purposes. A comparison of the mean from standard scores of achievement testing (91) to his tested IQ (94) is in the range of expectation and suggestive of consistency of effort and overall validity. Upper extremity testing that included manual and finger dexterity resulted in significantly below average scores, which are felt to be reflective of his presenting medical issues.

At the Deposition

About five months after the report was tendered, my deposition was taken. Prior to the deposition, I asked for and received updated medical records and called Mr. Lindsey. He told me that the intensity of his pain ratings had dropped somewhat as a result of an effective pain management program, but

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that he still experienced daily pain that reached a seven or greater on the pain scale. The medications continued to cause daytime somnolence, but he said he would rather sleep than suffer with pain. He had also undergone a neuropsychological evaluation that documented a mild to moderate brain injury.

During the deposition, the lawyers representing the insured (there were at least two companies being sued) questioned every element of my work on the case. They were thorough. They had at least 10 copies of depositions I had given in other cases and were looking for inconsistencies. There were none (or if there were, very minor ones). Because my evaluations are fairly standardized, I have learned not to dread these inquiries and am receptive to explaining issues. I am driven by our ethical tenets. In every vocational evaluation, there must be specific reasons for each and every step in the process. It is an ethical violation to simply test someone because the test is a way to spend time. In forensic evaluations, the vocational evaluator quickly learns that every test and procedure is going to be scrutinized. Table 4 summarizes my testimony as it related to the tools and techniques I used, and why I used them.

Table 4

Summary of Testimony

Domain	Source	Rationale/Comments
Physical Demands & Working Conditions	Referral Information; Vocational Interview; Behavior Observations	Functional Capacity Evaluation (FCE)s require comment in Report. Note differences of FCEs, Behavior Observations, and self-assessment from Vocational Interview
General Educational Development	Wide Range Achievement Test 4; Vocational Interview	WRAT4 covers necessary domains, is well normed and used, and is relatively quick. Comparison of attained versus functional academic levels
Aptitudes	Wechsler Abbreviated Scale of Intelligence (WASI-II); SAGE Vocational Aptitude Battery (VAB; selected components); Purdue Pegboard (PPB)	WASI-II has high correlation coefficient with WAIS IV; SAGE VAB dexterity tests are well normed and allow good observations. PPB is a standard in the industry and has good norms and opportunity for observations.

One of the obvious differences between the vocational evaluation process in forensic and non-forensic settings is the possible presence of secondary gain. In forensic settings, motivation of the person being

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tested is often called into question, whereas, in non-litigated settings, participation is commonly voluntary (thus eliminating the concern for secondary gain). Therefore, in forensic settings, concern is necessarily directed to consistency of data collected from the person being evaluated with medical and ancillary medical records as well as internal consistency of test data. Note in the testing recap in the Vocational Appraisal section of this case study the degree to which consistency of effort and test scores are discussed. This is in direct response to the issue of secondary gain that is so often alleged. Furthermore, as provided in the table above, rarely is one test or procedure considered to assess a particular domain. In most cases, triangulation of data is the standard.

After the Deposition

The case was mediated about a week after my deposition was taken and the case was settled. The settlement was "closed," meaning the parties agreed that the details of the settlement were not to be disclosed. The attorney later told me that my report and the documentation of the head injury via the neuropsychological valuation more than doubled the defendant's offer to settle. I guess he did not recall telling me during our initial contact about the case what was being offered.

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VECAP

A Technology Based ADA Physical Demands Pre-Employment/Post-Offer Assessment Tool for Industry

John J. Banks

Abstract

This article presents the results of a research and development project to design a technology-based pre-employment/post-offer assessment tool for industry that makes use of advances in computer and sensor technology. The goal of this project was to use criterion methods of isolated trait work sample physical demands testing that complement changes brought about by the Americans with Disability Act (ADA). The assessment tool measures the physical demands defined by the U. S. Department of Labor and used in the Dictionary of Occupational Titles. The tool allows the user to establish the job standards criteria based on the employer's measured physical demands analysis. It also allows the physical demands tests to be customized and compared directly to job standard criteria. The measured assessment results are immediately available electronically or to print after testing and are designed to meet legal requirements for candidate anonymity and test objectivity. The assessment tool can be administered in a variety of languages while maintaining the content and construct integrity of the instrument. Last, the assessment tool is portable if needed, and can be moved by the user to itinerant test locations. This project's goal is to economically provide the features listed above without the adverse impact to minority groups defined by the Uniform Guidelines on Employee Selection Procedures and without use of prejudicial normative performance comparisons.

A Technology Based ADA Physical Demands Pre-Employment/Post-Offer Assessment Tool for Industry

In the profession of vocational assessment, the traditional scope of practice has centered on the skills associated with aptitude, interest, behavioral, work skills, and other types of testing critical to the development and transfer of usable work traits in various settings. It has been this author's interest to focus on one worker trait area since the late 1970s, that being physical demands assessment. This interest grew out of experience working as a case manager specializing in the placement of injured workers. In 1983 it was the author's privilege to work on the initial draft of what would become the Americans with Disability Act (ADA). It became apparent as the law was winding itself through the legislative process that industry would need to change the way workers are qualified and hired. The ADA was the final piece of federal civil rights legislation affecting employment practices. It identified disabled people as a protected minority to be guaranteed equal access to employment (Equal

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Employment Opportunity Commission [EEOC], 1991). Unlike previous antidiscrimination legislation, the ADA required the employer to identify the essential physical demands that the employee candidate had to perform as part of their job duties. This meant that the employer could not inquire before hire whether a candidate had a disability, previous injury, disease, or perceived disabling condition. It became the employer's obligation to hire the candidate based on their ability to perform the essential demands required by the job. The ADA presented guidelines and rules for the hiring process (EEOC, 1991). The ADA guidelines allowed the employer to test whether or not the candidate had the physical ability to safely perform the job without risk to themselves or their co-workers. The initial ADA rules offered limited guidance to either the employer or the person with a disability, but over time the courts have delineated the intent of Congress. To make sure the employer does not discriminate because of artificially set physical performance standards, and to assure that they meet the federal hiring standards jointly agreed upon by the EEOC, Departments of Labor and Justice, and the Civil Service Commission, an objective and measurable standard reflecting the true physical requirements of the job must be established (EEOC, 1991). This requires input from labor as part of process and must not conflict with existing collective bargaining agreements in place. The most effective method for the employer to meet this requirement is to have a quantifiable job analysis as the means of identifying the essential demands of the job. This is typically an expensive, labor intensive and ever-changing process. However, the employer has the option to establish "general" job descriptions if candidates are qualified into a hiring pool. Qualified workers in the hiring pool may be placed in several positions such as is common in manufacturing, like the automotive assembly industry.

Pre-Employment and Post-Offer Testing

The terms pre-employment and post-offer are confusing for many and are often used interchangeably. They are, however, different, and distinct processes outlined in the ADA law. Under 42 U.S.C. § 12112 (d) (2) (A) and (B); 29 C.F.R. § 1630.13 (a) and § 1630.14 (a), a pre-employment test is considered a non-medical personnel exam and must not be conducted by a medically trained evaluator. Pre-employment assessments are typically referred to as "skills and agilities" tests and may include the same physical and other tests performed in the post-offer physical abilities medical examination. What makes pre-employment skills and agilities testing different from a post-offer exam is that it applies to situations where the employer chooses to assess all persons applying for a job opening as a first step and is viewed the same as any other personnel screening activity. Vocational evaluators, exercise physiologists, psychologists, and personnel professionals are typically used as pre-employment assessors. The reason the pre-employment skills and agilities test must be conducted by a non-medically trained evaluator is that a conditional offer of employment has not been extended to the candidate at this point in the hiring process. Certain restrictions apply to the application of a pre-employment test, however. Because it is not a medical exam, biological monitoring of the candidate is not allowed. This means that recording heart rate response, blood pressure, respiration, range of motion, and the like cannot be conducted as part of the test. This, of course, increases the possibility that the candidate may be at injury risk during physical demands test activities. If the pre-employment skills and agilities test were administered by a medically trained examiner such as a physical therapist, occupational therapist, nurse, or physician's assistant, it would constitute a conditional offer of employment by default, since only a medically trained examiner can provide a post-offer physical abilities medical examination.

As part of the conditional offer of hire, the employer has the option to perform a post-offer physical abilities medical examination. Under 42 U.S.C. § 12112 (d) (3); 29 C.F.R. § 1630.14 (b), a post-offer

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physical abilities medical examination can be conducted as part of the conditional offer of employment. Biological monitoring is allowed as part of the post-offer examination. Post-offer testing is usually preferred by employers who have high turnover or who find that a high number of candidates must be screened to qualify a candidate. The reason for this is simple economics since only persons meeting pre-screening criteria such as a background check, drug screening, education, or aptitude performance and/or licensure become candidates for a post-offer medical exam.

Establishing Valid Testing Methods

To prevent adverse impact on minority groups such as disabled people from occurring as part of the physical demands selection process, a measurable, documented, and defendable hiring standard must be in place as supported by job analysis. The long-standing definition for physical demands has been the U.S. Department of Labor's Dictionary of Occupational Titles (DOT) criteria as defined in the Revised Handbook for Analyzing Jobs (1991). The physical demands definitions used in the DOT are the direct result of the research conducted by Burt Hanman as part of the War Manpower Act of 1943 (Hanman, 1968). Originally known as the "Hanman Plan," it became part of the DOT in the late 1940s and is used in about 20 industrialized nations today as part of their repository of occupation definitions. In his book, *Physical Abilities to Fit the Job*, Hanman details the process of assessing the worker to specific job standards. As cited by Havranek (1988) even with the introduction of O*NET, the DOT continues to be used in Social Security determination, litigation, disability pension determination, and insurance rating. The Canadian National Occupational Classification (NOC) is a modern hybrid of this system. The continued use of the DOT is often preferred since it is a governmental standard long in existence that defines the physical demands of work in categories of strength, work posture, and worker interface. When the employer's job hiring standards are presented using the DOT's physical demands definitions, it offers hiring criterion that is less likely to be challenged on definition alone as might be less well known, theoretical, or arbitrary definitions. Using job analysis data that defines work using physical demands, DOT definitions also provide the employer with a strategy for introducing new hiring standards prior to job analysis. It has been common practice for manufacturers to use an existing DOT job definition as a temporary standard for hire until job analysis criterion can be established. This system has been accepted by the EEOC as a temporary measure.

The Need for a Standardized Assessment

With the promulgation of ADA regulations, there exist far-reaching implications for pre-employment post-offer testing. ADA regulations go beyond most affirmative action and equal employment structures. For the first time it required the job applicant who is disabled to be treated on a better than equal basis (EEOC, 1991). Some estimates place greater than 50 million persons as being classified as disabled (National Organization on Disability [NOD], 2004). The ADA restricts employment tests and assessment methods from screening out a candidate with a disability unless the test or assessment method is shown to be job related. Only skills, knowledge, or abilities essential to the job can be used to qualify the job applicant. It mandates that the employer demonstrate that the test or assessment method measures only the skill, knowledge, or abilities needed to safely perform the job. It has become increasingly important that the employer establish measurable essential job standards and that only this criterion be used to screen otherwise qualified workers who may have a disability for selection and hire. As industry began to follow the ADA guidelines, it became apparent that performing pre-employment and post-offer assessment in-house comes with risk. Soon after the ADA was implemented, employers began to be challenged with legal action by persons with

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disabilities claiming that such in-house testing provided continuing prejudicial denials of hire. In response to this, most employers today contract their testing services to an outside provider. During the 1990s, a good number of health care providers adapted their functional capacity evaluation (FCE) units for this market. However, this transition has had its share of problems in that most medical providers of FCE services continue to focus on the elements of disability, pathology, disease, and inability as part of the assessment process. Consequently, there has been an ever-increasing need to incorporate work ability testing elements in the assessment process that do not make use of normative data, theoretical constructs, or inability focus. Instead, a criterion-based testing method was needed. Also needed were culture, gender, and age neutral comparison methods required by existing civil rights and equal employment regulations and as originally mandated under the Uniform Guidelines on Employee Selection Procedures (1978).

In 1996, a project to develop a pre-employment/post-offer assessment tool that could provide these features in a system flexible enough to meet most employment testing environments began. Using evolving computer technology and previous experience in human performance test design, principals at Simwork Systems, Inc., in Tucson, Arizona, initiated the research and development of the ERGOS® Sapphire Work Assessment System. Simwork Systems determined that the DOT physical demands definitions provided a defendable foundation for cataloging strength, work posture, and worker interface elements found in most job analyses. The DOT physical demands system had worked well with the original development of ERGOS Work Simulator technology starting in the mid-1980s. The original ERGOS technology continues to be used throughout North America, Europe, and Australia for pre-employment testing, return to work assessment, and pension benefit testing. It was essential that the project develop a measurement and comparison tool that could match each defined physical demand to the matching DOT component. For each physical demand, an isolated trait work sample test activity was developed. For strength physical demands, including lift, carry, push, and pull, select isometric and dynamic test activities were developed using much of the research of Dusik, Menard, Cooke, Fairbain, and Beach (1993), Chaffin (1975), Chaffin and Park (1973), Chaffin, Herrin, and Keyserling (1978), Chaffin, Andres, and Garg (1983), Ayoub (1982a, 1982b, 1991), Ayoub, Denardo, Smith, Bethea, Lambert, Alley, and Duran (1982), Garg, Chaffin, and Herrin (1978), Battie, Bigos, Fisher, Hansson, Jones, and Wortley (1989), Jackson (1990), Jackson, Osburn, and Laughery (1984), Keyserling, Herrin, and Chaffin (1980), Mital (1983), Snook, Irvine, and Bass (1970), Snook and Ciriello (1974), and others to define protocols and methods for comparison. For postural test activities such as standing, stooping, kneeling, crouching, forward reach, overhead reach, and bended reach, research information from Astrand, Per-Olaf, Rodahl, Dahl, and Stromme (2003), Waters, (1991), Reilly, Zedeck, and Tenopyr (1979), and others was used to define protocols and methods. For worker interface test activities such as handling, fingering, feeling, and response to stimulus, research information from Greenberg and Chaffin (1978), Mathiowetz (1990a, 1990b), and others was used.

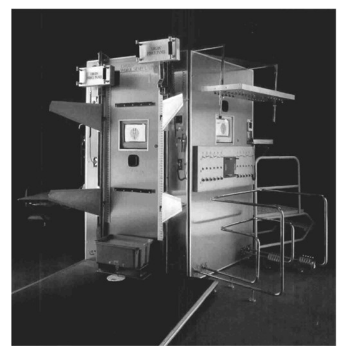

Figure 1
The ERGOS® Work Simulator

Developing the Test Hardware

Previous attempts to develop hardware strong enough to handle repeated testing use by industry had resulted in large, heavy, and space consuming designs. As shown in Figure 1, the original ERGOS Work Simulator required about 350–400 square feet of floor space to operate. That system was

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originally developed in 1986 before the advent of more compact and efficient mechanical designs available today. It weighed more than 1600 pounds and required a skilled technician to set up and maintain. It was in the shape of a pentagon and provided five test stations that allowed for simultaneous test activities to be conducted. Still in use today, surveys by Simwork Systems found that seldom were more than two test stations ever used at the same time.

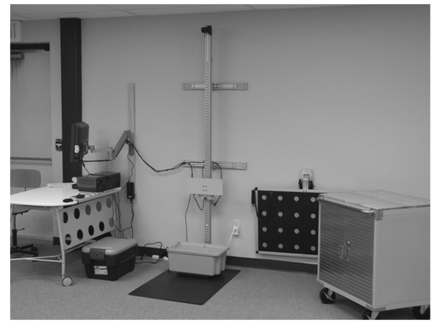

Figure 2
Single Monopole Design

The ERGOS Sapphire project goal was to develop compact, light, and portable assessment hardware that was flexible enough to be used in most industrial screening environments. The hardware was constructed of aircraft grade aluminum to reduce weight. An industrial "t-slot" component system offered the needed flexibility and customizable features required for manufacture. As shown in Figure 2, the resulting hardware design consisted of a single monopole containing a moveable shuttle that could house the various test components. These designs also allowed the user to expand the test system at will should their assessment need to change. For example, these features allowed for multiple monopoles to be added for high volume testing as shown in Figure 3.

Figure 3
Multiple Monopoles

Figure 4
Isometric Strength Hardware

The test module hardware was designed to easily fit into the monopole shuttle with a simple mechanical latching system. In this way, test activities could be changed in minutes thus saving time and offering the ability to customize tests to meet the employer's job standards. Four test modules were developed. The first module consists of isometric hardware that measures static lifting, pushing, and pulling strength. As shown in Figure 4, the hardware consists of two isolated handles that measure the evaluee's isometric strength. The handles are changed to vertical or horizontal axis by simply removing the knob at each end of the handle and re-positioning the hardware as dictated by the test activity. Like all hardware, the shuttle containing the isometric test hardware is moved up or down into test position and fastened in place using a hand brake and quick release pin through the shuttle and monopole. Strength performance is recorded via isolated load cell technology for left and right sides and compared to standards via computer electronic interface.

The second test module is a dynamic strength destination hanger that holds the lift box used to test dynamic lift and carry strength. Again, this hardware connects into the shuttle and can be moved and pinned into position as required by the test activity. The hardware shown in Figure 5 includes a

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dynamic lift box containing weights that is lifted from the floor and placed in position on the destination hanger on the monopole. Additional hardware consisting of a scale on the floor records the weight lifted and a string potentiometer attached to the lift box monitors the speed, consistency, and location of each test activity.

Figure 5
Lift/Carry Hanger Hardware

Figure 6
Work Posture Hardware

The third test module is a touch panel used to assess forward reach, overhead reach, bended reach, stooping, kneeling, crouching, and standing work postures. The touch panel is carried in the shuttle and is moved into position and pinned in place like modules one and two. The touch panel is mounted on a pivot arm that can be changed from vertical to horizontal orientation to correspond to the test activity. Figure 6 shows the work posture hardware set up for forward reach testing. The work posture test hardware consists of a panel containing 24 metal discs that have a two-color light above each. The test is a timed activity requiring the evaluee to touch the disc below the light in a random pattern. The evaluee touches the disc by responding with a tethered electronic wand to the appropriate light, which lights either red or green. Red lights are touched with the right wand and the green light is touched with the left wand. Right/Left response time, overall performance time, and other data is collected via computer and compared to the employer's performance standard.

Figure 7
Grip Strength Hardware

Module four uses four test components that measure grip strength, pinch strength, pronation/supination forearm strength, flexion/extension wrist strength, handling dexterity, and fingering dexterity. Module four test components shown in Figures 7 through 10 are not used on the monopole, but on a testing table nearby. Each test component in module four connects to the test computer via a USB interface for test operation and recording the evaluee's performance.

Developing Physical Demands Test Protocols

Of the three physical demands areas defined by the DOT (i.e., strength, posture, worker interface), strength test activities are the simplest to measure. When an employer measures the strength requirements for a job, the method is direct. It is a rather straightforward process to identify the weight a worker is able to lift, together with the frequency, start, and end destination heights and distance moved. This makes the establishment of strength performance criteria easy to understand. The ERGOS Sapphire assessment tool tests and compares strength in a direct manner and enables the user to set the frequency load of the lift and/or carry test to match the employer's criterion standard. Unlike a number of approaches found in performance testing that use anthropometric landmarks for test comparison, the protocols developed for this project match the job standard directly. This prevents lawsuits by persons who may fail a test from claiming that the test was prejudiced because of

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height comparison criteria. The reality is that a specific job standard that cannot be modified, or adapted under the reasonable accommodation mandate of the ADA law [42 U.S.C. § 12112 (b) (A)] requires the worker to be able to perform the essential lift standard as measured by the employer's job analysis.

Figure 8
Pinch Strength Hardware

The development of objective criterion-based job standards for other than strength is more difficult. This was first researched by the author in the early 1970s. It became apparent as pre-employment testing programs came into vogue that physical demand performance comparisons needed to be fair in terms of ethnicity, gender, age, and culture if they were to stand legal challenges. Unlike direct strength performance comparison, postural work and worker interface performances need to be compared to competitive criterion having a time-work measurement component. Postural and worker interface tests involve movement over time as an essential element of their structure. Traditional work sample tests record the set or number of work cycles in a standard amount of time for comparison to a group norm or standard. Because of their prejudicial nature, norms began to be dropped as an acceptable method of test performance as ADA rules were implemented. This led to the acceptance of Methods-Time measurement (MTM) as the primary method of performance comparison. MTM performance comparison became an acceptable and defendable method of comparing the worker applicant to job standards since it is a work performance measurement system that uses only quantitative elements of work as the comparison criterion. The author's own experience started with graduate research in using MTM standards comparison in work sample design Banks (1972) and continued in the years that followed through the revision of a number of popular work sample designs used at the University of Wisconsin–Stout (Banks, 1974). Considerable work in this approach was later pioneered by Bill Snellen in his development of MTM standards for companies such as Work Recovery, Inc., Valpar International, and Hanoun Snellen (1991, as cited in Banks 1986, pp. 78-81). The Snellen MTM approach was incorporated into all timed performance testing used in the ERGOS Sapphire assessment tool. Because MTMs are fair in terms of age, gender, ethnicity, and culture, it reduces the challenges often faced when normative test comparison is used in employment testing. The benefit of using MTM standards is that most large industry is familiar with its use and can readily establish the hiring criterion from existing job analyses with little added time or expense. This allowed ERGOS Sapphire assessment results to be compared to standard job analysis performance standards for each test work sample. It also improved the purity of the isolated trait being tested and made comparison of the evaluee's MTM performance to DOT-defined physical demands more accurate. The consequence of this is the evaluee's performance does not need interpretation. It directly compares to the employer's hiring standard.

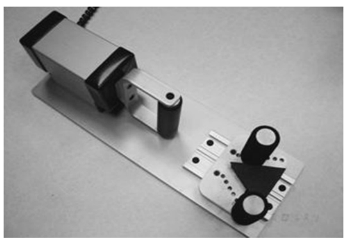

Figure 9
Combination Pronation/Supination-Flexion/Extension Strength Hardware

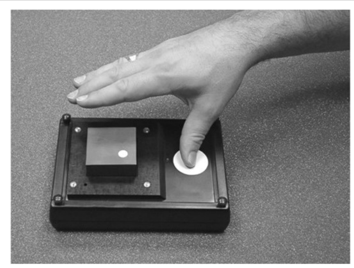

Figure 10
Handling/Fingering Dexterity Hardware

To assure that each evaluee receives the same test each time it is administered, the ERGOS Sapphire administers the instructions via computer using a pre-recorded script. The instruction set provides a

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practice trial to make sure that the evaluee does, in fact, know how to perform the test activity. If the evaluee is confused about, forgets, or has not learned the test sequence, the practice trial can be repeated. Since the test protocols have been factored for simplicity, learning and practice effect are dramatically reduced. Non-English speaking evaluees can take the test in their spoken language. It was determined during this project to include the selection of other language instruction sets to meet this need. The evaluator can select the evaluee's language if needed to assure that the test has been fairly administered. To assure that the same test is administered in the selected language, construct and content parity has been provided. When the test is administered, the printed instruction set is also shown on the computer screen together with visual graphics to allow the evaluee to use their usual method(s) of learning. This provides visual, auditory, and kinesthetic instruction on all tests.

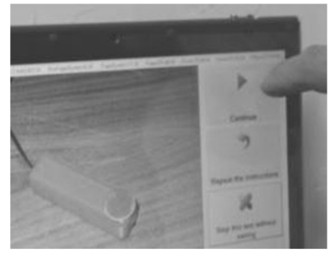

Figure 11
Touch Screen Acknowledgement

Informed consent is a requirement for pre-employment/post-offer assessment. It is critical that the evaluee is informed of what they are expected to do during the test and acknowledges such. It is also essential that the evaluee consents to participate in the activity prior to the start of the test. This eliminates claims that the evaluees were not informed of what was expected of them during the test or that they did not have the opportunity to ask questions about anything not understood prior to participation. The ERGOS Sapphire protocol provides the opportunity at the end of the instruction set for the evaluee to ask any questions. As shown in Figure 11,, the protocol also requires the evaluees to "touch" the computer touch screen to indicate that they understand the instructions, that they have no further questions, and that they wish to start the test. Only the evaluee can make the test begin by touching the computer screen. This process has held up to challenges when evaluees have failed a test and made a claim that they "did not know what to do" when they performed the test activity.

Figure 12
Touch Screen Computer

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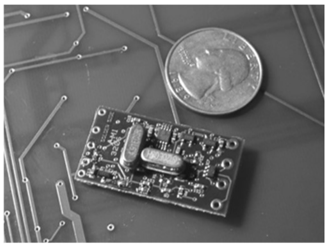
Developing the Electronic Interface



Picture 13
USB Electronic Interface

Coordinating the data measured by the ERGOS Sapphire hardware with the test protocol instruction set required an electronic interface. A computer engine is required to operate the electronic interface. As shown in Figure 12, a touch screen computer is used so that the evaluee can provide a recorded touch response to the instruction set. The hardware measures performance in three ways: weight or effort lifted, carried, pushed, or pulled using load cell technology; by speed of lift or position of hardware using potentiometer technology; or by recording time by tuning on or off a clock using switches. The load cells, potentiometers, and switches need to communicate with the computer through the electronic interface. Recording time is the easiest interface and uses the internal computer clock to start and stop timing. Load cell and potentiometer measurement requires the hardware to convert analog data to digital so the computer understands the information. As shown in Figure 13, an analog to digital (A to D) electronic interface had to be designed that was small and robust enough to perform this. It needed to be able to communicate with the computer via the USB port so no special connection hardware would be required. This also allowed the hardware to be plugged into the computer and immediately recognized by the operating system. Other off-the-shelf interfaces were used in this project together with proprietary electronics that turn on and off test hardware lights in coordination with test protocols, amplify digital signals, and record when test components are not operating within calibration standards. The computer design selected for the ERGOS Sapphire project included touch screen interface. This meant that either a common tablet laptop computer or an all-in-one desktop computer with an LCD touch screen could be used. The tablet computer complements the hardware designed for portable use. The all-in-one computer offers the benefit of a large screen area. The computer administers the test, records evaluee performance and the evaluator's notes, and generates the reports. The computer touch screen makes for easy evaluee response to the test.

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Job Comparison

Description	Rating	Standard
Static Strength: Lifting, Height Bench (36 in)		60.00 lb
Static finger strength: Lateral Pinch Strength, Right hand	19.12 lb	10.00 lb
Static finger strength: Lateral Pinch Strength, Left hand	15.78 lb	10.00 lb
Static finger strength: 3-Point Pinch Strength, Right hand	7.03 kg	5.00 kg
Static finger strength: 3-Point Pinch Strength, Left hand	6.15 kg	5.00 kg
Body postures: Forward Reach, Height Forward (112,5 cm)	121.7 %	75.0 %

Figure 14
Pre-Employment or Post-Offer Job Comparison Report

Assessment Program Operation and Recording

The ERGOS Sapphire assessment program operates on a Windows™ software operating system. It is structured to measure all assessment performances as an evidentiary record. This provides documentation backup when an assessment is challenged. All assessment incidents generate a report containing detailed data. This includes the name of the facility, evaluator, the date, time, and duration of the test, as well as any coded identifying information that might be used to keep the evaluee anonymous. Reports can be structured to present assessment data in an ADA job comparison format, as shown in Figure 14. All reports can be saved in secure and encrypted formats for electronic transfer and signature as mandated by HIPAA regulations. Assessment data can also be presented in a

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summary report format as shown in Figure 15 that compares the evaluee's performance to DOT strength ratings or to MTM competitive performance standards.

The ERGOS Sapphire can also be used for other assessment markets such as functional and work capacity evaluation, return to work testing, disability determination, long-term disability assessment, and pension benefit eligibility testing to name a few. Options include detail reports containing clinical data as shown in Figures 16 and 17. These reports provide the opportunity for input from the evaluator through observations and the evaluee's recorded report of subjective discomfort or fatigue of body areas. Reports can be expanded by condensing them into a combined report or by selecting specific details for inclusion in the evaluator's report using word processing programs such as Microsoft Word™, OpenOffice Writer, or WordPerfect® and make use of PDF or RTF formats. A work capacity report using the DOT or NOC classifications is also available for documentation of the evaluee's workday strength rating. The ERGOS Sapphire project has produced an assessment tool that is flexible, economical, and easy to use. It continues to evolve as it is used in industry throughout North America, Europe, and Australia and is covered under pending patents worldwide.

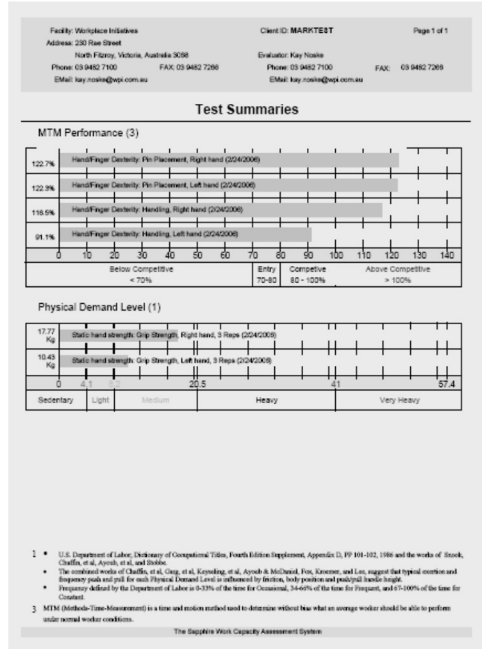

Figure 15
Test Summary Report

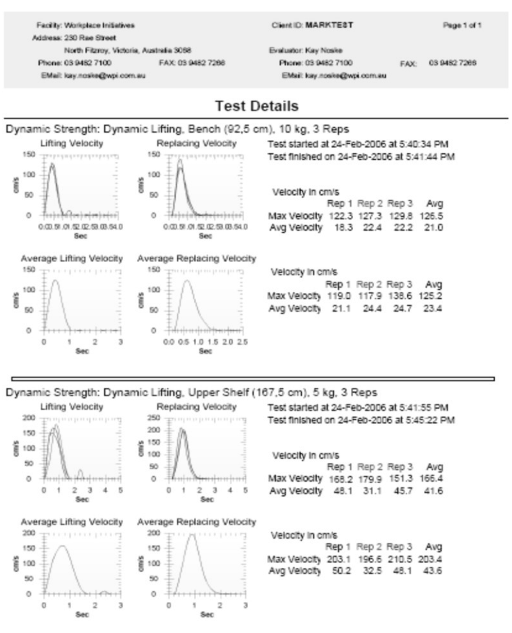

Figure 16

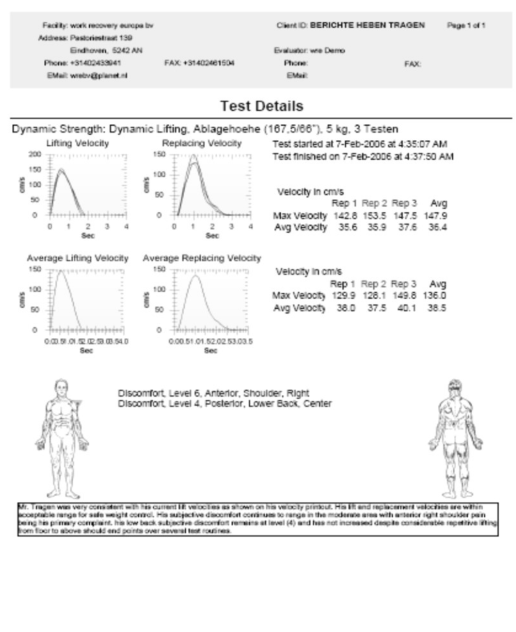

Figure 17

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Detail Report Showing Dynamic Lift Data

Detail Report Showing Discomfort Ratings and Notes

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About the Author

John J. Banks has been involved in many aspects of rehabilitation, public, private, for-profit, not-for-profit, and corporate business sectors. He began his career as chief vocational evaluator working in the inner city in Cleveland, Ohio, in 1971. Next, he went to New Hampshire and helped establish one of the first comprehensive state DVR-operated vocational rehabilitation assessment centers in North America. He was senior vocational evaluator for the State of New Hampshire. He then became facility director for the New Hampshire Easter Seal Society, operating the Industrial Training and Work Adjustment Program returning industrial and disadvantaged disabled workers to community employment using the “real work” adjustment model. His real work adjustment system integrated workers who were non-disabled and disabled in a factory production environment having two shifts.

Banks’ rehabilitation success led to the establishment of one of North America’s first private, for-profit Workers’ Compensation case management and assessment firms, Rehabilitation Consultants, Inc. (RCI), which he founded and served as chairman of the board. The corporation eventually grew to a regional business serving four New England states (New Hampshire, Maine, Vermont, and Massachusetts). RCI introduced the first Workers’ Compensation managed care model in the United States. RCI was sold to Cigna and is now part of the rehabilitation case management division of that company. During his tenure at RCI, Banks developed in 1977 the first predictive functional physical demands assessment protocol, and while on sabbatical, served as executive director of the National Rehabilitation Counseling Association, where he worked with the initial Congressional legislative sponsors of the Americans with Disabilities Act (ADA). From Washington he was recruited as the director of vocational rehabilitation for the U. S. territory of American Samoa serving a two-year appointment from 1984 to 1986.

In 1986, Banks helped establish Work Recovery, Inc. (WRI), initially as a consultant bringing his protocol for functional assessment that would be integrated into the computer-interactive ERGOS Work Simulator system. Banks continued to work for WRI serving as director of research and development, vice president of international development, where he set up WRI’s operations in Australia, Canada, and Europe. In 1996, he assumed the position of vice president of research and

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development until 1998, when he commenced computer-interactive work sample and human performance testing research as partner in Simwork Systems, and has assisted with the development of the patented Sapphire™ Work Assessment System.

Banks established WorkEval™, a comprehensive assessment/testing and consultation company in Colorado. WorkEval™ currently provides auto accident/personal injury work capacity assessment, ADA pre-employment worker testing, disability and employability risk management consultation, and forensic work capacity assessment. WorkEval™ also provides consultation to manufacturing and health care businesses on issues of risk management, ADA hiring methods, and employee fitness for duty/return to work assessment strategies.

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24 - Test Review

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Test Review: State-Trait Anger Expression Inventory-2 (STAXI-2)

Lauren Bethune Scroggs

Test Author: Charles D. Spielberger, PhD

Publisher Contact and Ordering: PAR Psychological Assessment Resources, Inc.; 16204 North Florida Ave.; Lutz, FL 33549; tel: 1.800.331.8378; website: www.parinc.com

Date of publication: STAXI-2 Professional Manual: 1988, 1996, and 1999. STAXI-2 Item Booklet (Form HS) and STAXI-2 Profile Form: 1979, 1986, 1988, 1995, 1998, and 1999.

Cost: The STAXI-2 Introductory Kit (includes STAXI-2 Professional Manual, 25 Reusable Item Booklets, 50 Rating Sheets, and 50 Profile Forms) is listed at $361.00. When purchased separately, the STAXI-2 Professional Manual or e-Manual is listed at $71.00, a pack of 25 Reusable Item booklets is $78.00, a package of 50 Rating Sheets (form HS) is $128.00, and a package of 50 Profile forms is priced at $107.00. The CD-ROM STAXI-2: IR and the STAXI-2 IR Download are listed separately for $642.00 each. The STAXI-2 i-Admin, the STAXI-2 Score Report, and the STAXI-2 Interpretive Report are now available on PARiConnect. The STAXI-2 i-Admin provides on-screen test administration and is $4.00 per use with a minimum order of 5. The STAXI-2 Score report provides scores and profiles based on the data collected from an i-Admin or a paper-and-pencil assessment and is $3.00 per use with a minimum order of 5. A STAXI-2 Interpretive report can be purchased for $6.00 per use (minimum order of 5) and provides scores, profiles, and interpretive text based on data from and i-Admin or a paper-and-pencil assessment. These purchase parameters were retrieved from www.parinc.com on January 28, 2020. Please refer to website for updated pricing.

Examiner Qualifications: The STAXI-2 may be administered and scored by a paraprofessional who has experience with assessments and is familiar with the procedures presented in the STAXI-2 Professional Manual (Spielberger, 1999). The manual explicitly states, however, that an individual with professional training in psychology, psychiatry, or educational testing must interpret the results of the scales and subscales assessed in the STAXI-2 (Spielberger, 1999).

Vendor purchase requires a qualification level of B for the STAXI-2 (PAR Inc., 2020, “Qualification Level,” para. 1). Interpretive software, the STAXI-2:IR, by Peter R. Vagg and Charles D. Spielberger, is

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available and provides interpretation of STAXI-2 scores based on hand-entry of item scores. This software generates an interpretive report by examining an individual's scale and subscale scores.

Training: The test vendor does not provide training for the STAXI-2 (Danielle Greer of PAR Inc., personal communication, March 7, 2016).

Purpose, Development, and Standardization

Purpose: The STAXI-2 is a self-report assessment instrument used to measure the experience, expression, frequency, and control of anger. The STAXI-2 was also developed to assess the potential relationships between an individual's measures of anger (states of anger, anger as a personality trait, and types of anger expression) and medical conditions (PAR Inc., 2020).

Type: Emotional Functioning/Personality/Mood Assessment

Nature of Content: Measures experience, expression, quality, and frequency of anger

Items: Items in the STAXI-2 are presented as scaled, multiple-choice questions. There are 57 items in the STAXI-2.

Reading Level: The STAXI-2 Professional Manual (1999) recommends that a test taker be able to read at a six-grade reading level, which is based on the analyses of the STAXI-2 instructions and test items. The manual cautions examiners to remember that a test taker's completion of a grade level is not a reliable indicator of reading ability (Spielberger, 1999).

Language: The STAXI-2 was originally developed in English but has been translated into other languages, including Arabic, Chinese, Dutch, Farsi, French Canadian, Hebrew, Hindi, Hungarian, Korean, Norwegian, Polish, Romanian, Spanish, Urdu, and Vietnamese (PAR Inc., 2012). The European Spanish version of the STAXI-2 was designed particularly for Spanish-speaking clinicians and clients since all materials, including the professional manual, have been translated into European Spanish and normative data was collected in Spain and several countries in Latin America. Additionally, specific test items in the Spanish version have been altered from the English version to account for differences between Spanish and English cultural values and languages (PAR Inc., 2020).

Subtests and Separate Scores: The Revised STAXI-2 has six scales, five subscales, and an Anger Expression Index (Spielberger, 1999). The six scales included in the STAXI-2 are State Anger (*S-Ang*), Trait Anger (*T-Ang*), Anger Expression-Out (*AX-O*), Anger Expression-In (*AX-I*), Anger Control-Out (*AC-O*), and Anger Control-In (*ACI-I*). The State Anger Scale has three subscales: Feeling Angry (*S-Ang/F*), Feel Like Expressing Anger Verbally (*S-Ang/V*), and Feel Like Expressing Anger Physically (*S-Ang/P*). Additionally, the Trait Anger Scale has two subscales: Angry Temperament (*T-Ang/T*) and Angry Reaction (*T-Ang/R)*. The Anger Expression Index (*AX Index*) is provided in order to give a general index of anger expression, which is based on the test taker's responses to items within the following scales: AX-O, AX-I, AC-O, and AC-I (Spielberger, 1999.)

The STAXI-2 Professional Manual (1999) provides normative tables within Appendixes A and B that can be utilized to translate the raw scores of each scale to percentile ranks and the raw scores of each of the subscales to T scores. Within the STAXI-2 Manual (1999), norms are provided by gender for normal adults and psychiatric patients in Appendixes A and B. The test publisher also provides a

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profile form for charting the percentile ranks and/or T scores to enable an overall graphical representation of an individual's response patterns in the scales that assess the expression, experience, and control of anger (Spielberger, 1999, p. 9).

Norms: The normative data provided in the STAXI-2 Professional Manual (1999) is based on responses from two different populations. One population consisted of a heterogeneous sample of 1,644 normal adults consisting of 977 females and 667 males (Spielberger, 1999). The mean age for the total normal adult population was approximately 27 years of age and the ages ranged from 16 to 63 years old. The manual explains that the normal adult population sampled included individuals from a variety of educational and vocational backgrounds, which the test developers believed was representative of the general population (Spielberger, 1999). Normative data for the STAXI-2 was also collected and based on responses from a second population of adults. The second population, termed the hospitalized psychiatric patients in the context of the manual, consisted of 276 individuals (105 females and 171 males) that were admitted to a dual diagnosis inpatient program for treating psychiatric concerns and addictions. This population was administered the STAXI-2 at the time of their admission to the dual diagnosis inpatient program at a hospital facility (Spielberger, 1999).

Reliability: The alpha coefficients for all the scales and subscales of the State Anger (*S-Ang*) and Trait Anger (*T-Ang*) in the STAXI-2 were significant, indicating a high level of internal reliability. Except for the 4-item *T-Ang/R* subscale for normal adults (.76 for a sample of 962 females and .73 for a sample of 659 males), the alpha coefficients were .84 or higher for each of these scales and subscales. Additionally, Spielberger (1999) reports statistically significant differences between the scores of the normal adult and the psychiatric patient populations in both the *S-Ang* and *T-Ang* scales. The alpha coefficients reported for the Anger Expression (*AX-O, AX-I*) scales, the Anger Control (*AC-O, AC-I*) scales, and the AX Index range from .73 to .93 (Spielberger, 1999). The consistent and significant alpha coefficients reported indicate an adequate level of internal consistency in these scales and the index, which does not appear to be influenced by gender or possible psychopathology (Spielberger, 1999).

The STAXI-2 also shows high levels of reliability in testing across cultural and ethnic groups. For example, Culhane and Morera (2010) compared the STAXI-2 results from a sample of non-Hispanic White participants (n = 246) and a sample of Hispanic participants (n = 257) and the resulting coefficient alphas suggested high levels of internal consistency and strong subscale intercorrelations (the coefficient alphas for each group were above .70). No test-retest reliability was provided.

Standard Error of Measurement: The SEM is not provided in the manual.

Validity: The validity provided in the STAXI-2 manual is derived from measures collected on the original STAXI (Spielberger, 1999. Over the years, the STAXI's structure and items have been continuously revised as a result of reliability and validity data collected from ongoing studies (Lievaart, Franken, & Hovens, 2016). The development of the STAXI-2 incorporated much of this data and expanded the number of questions on different scales. Additionally, the Anger Control Scale was separated into two subscales: anger control in and anger control out.

The Concurrent validity was measured, and significant correlations were found between the STAXI, the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957), and the Hostility and Overt Hostility scales of the Minnesota Multiphasic Personality Inventory measures (MMPI)).

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Practical Evaluation

Qualitative Features: The STAXI-2 test materials include: a reusable test booklet, a carbonless rating sheet (form HS), and a profile form for plotting T scores and percentiles on opposite sides of the form. Additionally, all testing materials are relatively attractive and easy to use. The STAXI-2 professional manual is a requisite for the scoring and interpretation of the assessment.

Administration: The STAXI-2 can be administered to a group or individually and test instructions are provided within each Item Booklet (form HS).

Start and Discontinue Rules: Start and discontinuation rules are not explicitly stated in the test manual; instead the manual highlights the importance of ensuring that test takers provide answers for each question for valid results (Spielberg, 1999).

Time: Administration: Five to 15 minutes; Scoring: Approximately five minutes.

Recording: Test-takers must use a sharp pencil or pen to mark the STAXI-2 rating sheet self-report (form HA).

Scoring: The scoring directions are straightforward and uncomplicated. Test users may want to double-check personal calculations in part 3, because simple calculation errors can occur. Additionally, the STAXI-2:IR is an available software for the hand-entry of item scores, which examines an individual test-taker's scale and subscale scores and provides a comprehensive interpretive report of the scores (PAR Inc., 2020).

Accommodations: The STAXI-2 professional manual (1999) states:

> For individuals who are unable to complete the STAXI-2 according to the standard administration format due to reading difficulties, the examiner may read the STAXI-2 items aloud, but the examinee should record his or her own responses on the answer sheet in the standard manner (Spielberg, 1999, p. 4).

Reviewer Comments

There is a substantial amount of research supporting the psychometric properties of the STAXI and the STAXI-2 as anger assessment tools and helpful instruments that measure the experience, expression, frequency, and control of anger. In fact, the STAXI-2 is one of the most widely used anger measures in both clinical and research settings (Novaco & Taylor, 2004). The extensive bibliography of research alone, which is presented in the STAXI-2 professional manual, further supports the claim that the STAXI-2 is an accurate measurement of different forms of anger. However, the STAXI-2 may not be a good assessment instrument to use when working with individuals with low levels of anger. This is because the STAXI-2 is insensitive in adequately discriminating among individuals with lower level scores (Spielberger, 1999). The STAXI-2 professional manual (1999) indicates that the test is insensitive to differentiating between individuals with lower levels of anger, because the distributions of raw scores for several scales are positively skewed. However, the manual (1999) contends that, "from a clinical perspective it is generally more important to detect high levels of anger than to differentiate among persons with low anger scores" (p. 55). The STAXI-2 presents with a strong degree of face validity as an anger assessment instrument due to the nature of its questions and

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scales.

Spielberger (1999) notes in the manual that, "valid administration of the STAXI-2 also assumes that the examinee is physically and emotionally capable of meeting the normal demands of testing with self-report instruments" (p. 3). The manual cautions test examiners to use their discretion when testing individuals with cognitive deficits or neurological conditions (Spielberger, 1999). Further, the manual highlights the importance of being alert to any variable that may interfere with the validity of administering the STAXI-2 to individuals with disabilities. Apparently, the assessment of individuals with disabilities needs to be considered by the administrator on a personalized, case-by-case basis. Although there are not specific accommodations listed in the professional manual beyond the aforementioned accommodations, various studies have been conducted to investigate the implications of using the STAXI-2 with populations with varying types of disabilities. In one study, Burns, Bird, Leach, and Higgins (2003) utilized the STAXI-2 with forensic inpatients with learning disabilities. Due to the participants' levels of intellectual functioning during this study, items on the STAXI-2 were read aloud to participants in accordance with the recommended procedure found in the STAXI manual for assessing individuals with reading difficulties (Burns, et al., 2003).

The STAXI-2 has been utilized in several settings to review relationships and risk factors between the anger measures quantified by the STAXI-2 and differing populations. Barbour and Eckhardt (1998) examined the relationship of the experience and expression of anger and violent behavior in different male populations. Additionally, the STAXI-2 has been used to assess the impact and efficacy of anger management group treatment for male veterans with PTSD displaying aggressive behaviors (Gerlock, 1994).

Furthermore, the use of the STAXI-2 has been further studied with a variety of populations. A study investigating the psychometric properties and the use of the STAXI-2 in a sample of male inmates supported the use of the instrument as a diagnostic tool employed in correctional institutions (Etzler, Rohrmann, & Brandt, 2014). The use of the STAXI-2, in conjunction with collateral assessments and clinical impressions, has been shown to be a useful tool to inform case formulation and tracking changes in anger experiences in a sample of male forensic inpatient clients in the United Kingdom (Gilderthorp, Wilson, and Tapp, 2019).

The extensive use and research conducted on the use of STAXI-2 indicates a high validity and reliability across populations, cultures, and languages (Novaco and Taylor, 2004). The results of this test can prompt further investigation into an individual's states and traits. It is a simple test and can be scored fairly quickly and with ease.

Currently, there is a dearth of literature connecting the STAXI with careers or vocations, though it may be a helpful instrument for use in vocational evaluation. The STAXI can be used as a screening tool for clients who may exhibit anger issues during the evaluation process. The results of the STAXI can potentially assist in identifying clients with anger issues and thus facilitate a recommendation for clients whose anger may need to be addressed clinically.

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Summary Evaluation

This report is an update to Liao's (2014) thorough evaluation of the STAXI-2. The STAXI-2 is a self-report assessment developed to measure the experience, expression, frequency, and control of anger in individuals. The STAXI-2 is based on a strong conceptual foundation and has shown strong psychometric properties consistently, with data from a wide array of differing normative populations. The STAXI-2 is easy to administer, score, and interpret, and can be utilized in a time effective manner in a variety of settings. The STAXI-2 assesses risk factors that may be linked to substance abuse issues, and can be used as a screening tool in treatment settings that may guide action plans. Additionally, the STAXI-2 can be used in practice to assess the impact and efficacy of anger related treatment programs. The STAXI-2 is a good screening instrument that can be utilized in a variety of ways by licensed professional counselors and rehabilitation professionals.

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Lauren Bethune Scroggs, MS, NCC, CCMHC, LCASA, LCMHC, is a PhD candidate in rehabilitation counseling and administration at East Carolina University (ECU). She received her master's degree in substance abuse and clinical counseling from ECU and her bachelor of science degree in biology with a minor in chemistry from the University of North Carolina at Chapel Hill. Bethune Scroggs has worked with a wide range of populations, including adolescents, adults, students, veterans, individuals with chronic conditions, and clients on federal supervision. She specializes in biofeedback, mental health, and addiction counseling. Her research interests include substance use, misuse, and addictions in a variety of populations; the use of biofeedback and applied psychophysiology in stress-related physical conditions, mental health, and substance use disorder treatment; and evidenced-based treatment practices.

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