

Same Tests – Different Jobs: Developing Tests to Assess Candidates for Multiple Positions

Todd A. Baker, Ph.D.

Deborah L. Gebhardt, Ph.D.

Human Performance Systems, Inc.

OUTLINE

- 1. Issues
- 2. Job Analysis
- 3. Test Development
- 4. Test Validation
- 5. Passing Score Generation

ISSUES

- Organization has numerous jobs that perform physically demanding tasks.
- The Jobs Include:
 - Telecommunications Positions
 - Coin Telephone Collector
 - Automotive and Building Mechanic
 - AC/HVAC Mechanic

CONCERNS

- The organization
 - Does not want multiple tests due to cost, administration concerns, and administration across multiple locations
 - Wants evidence to support the validity and defensibility of the test
 - Wants passing scores to accurately reflect the demands of each job

SOLUTION

- Develop a single physical performance test that will apply to multiple positions.
- Test will be valid and legally defensible for all positions.

JOB ANALYSIS – GOALS

- Identify essential tasks, required abilities, and working conditions for the jobs being examined
- Collect job-related information that can be applied to the development of tests and generation of passing scores
- Collect information that allows for accurate and efficient comparisons across jobs

MEETING JOB ANALYSIS GOALS

- Use of a task list that includes tasks applicable to most, if not all, jobs
 - SMEs from each job would provide ratings (e.g., Frequency, Importance) for each task
 - Ratings are used to identify essential tasks for each job and compare jobs for task similarity
 - Task similarity results are used to determine if the same test is applicable for multiple jobs

EXAMPLE TASKS

FREQUENCY RATING SCALE (FREQ)

- 5__ 1 or more times per hour
 - 4__ 1 to 4 times per day
 - 3__ 1 to 4 times per week
 - 2__ 1 to 3 times per month
 - 1__ 1 to 6 times per year
-
- 0__ Not performed by the job

IMPORTANCE RATING SCALE (IMP)

- 5__ Task is extremely important and essential to successful job performance
- 4__ Task is very important to successful job performance
- 3__ Task is important to successful job performance
- 2__ Task is related but of low importance to successful job performance
- 1__ Task is not important to successful job performance

		FREQ.	IMP.
1	Lift and carry equipment that weighs 30-50 lbs. 25 to 100 feet.		
2	Ascend/descend stairs carrying tools, equipment, and materials weighing 10-20 lbs.		
3	Climb unstepped poles wearing tool belt, handling, voltage tester and safety belt.		
4	Climb ladder.		
5	Use hand tools (e.g., wrench, screwdriver, pliers) to repair/install cable, remove/repair defective equipment, or assemble work aids.		
6	Dig holes or trenches with shovel.		
7	Push/pull 2-wheel carts loaded with tools and materials (30-180 lbs.).		

COMMON TASK LIST IS NOT FEASIBLE

- Some jobs may be too varied to use a common task list – not enough tasks applicable to the jobs
 - In this case an abilities analysis is conducted
 - Task lists specific to jobs are rated by SMEs
 - The ratings are used to identify essential tasks for each job
 - The essential tasks are rated by SMEs on the level of various abilities needed to perform each task
 - The rating scales used are behaviorally anchored and are applicable for all tasks

ABILITIES ANALYSIS

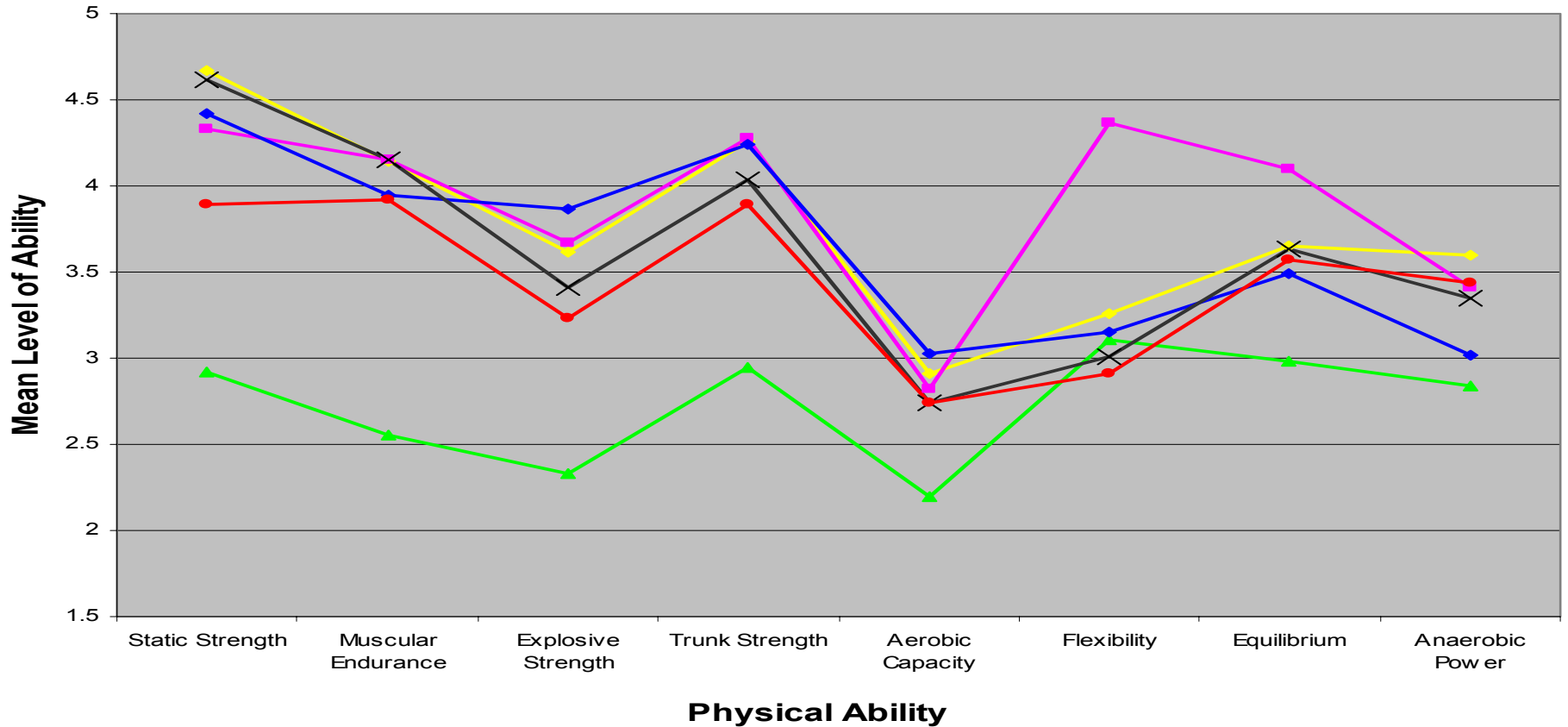
- The ratings for each ability are averaged across all tasks to determine the ability mean
- The ability means for each position are used to generate a physical abilities profile
- The profile shows the level of each ability required to perform essential tasks
- The profiles are compared across jobs to determine if:
 - The abilities required for the jobs are similar
 - The level of the abilities required to perform essential job tasks are similar

PHYSICAL ABILITIES

- Static Strength
- Muscular Endurance
- Explosive Strength
- Trunk Strength
- Aerobic Capacity
- Flexibility
- Equilibrium
- Anaerobic Power

PHYSICAL ABILITIES PROFILE

Mean Physical Ability by Job Title



Legend: Cable Repair (yellow diamond), Cable Splicing (magenta square), Electronics Tech (green triangle), Network Tech (blue diamond), Outside Plant (black cross), Service Tech (red circle)

LEVEL OF ABILITIES NEEDED

- A number of positions may require the same ability
- However, the level of ability needed may vary across jobs
- One way to determine the level of abilities required for jobs is using the abilities analysis
- Another method is to use supplemental questions

SUPPLEMENTAL QUESTIONS

- Provide more detailed information about the working conditions, circumstances, and ergonomic parameters associated with tasks
- For example, a task statement may be “Climb ladders to repair equipment”
- Supplemental questions related to this task may be:
 - Heights the ladder is climbed
 - Type of ladders climbed
 - Is equipment carried while climbing
- This climbing task may be essential to a number of jobs. However, the supplemental question results may indicate that the task is more physically demanding for some jobs than for others

■ EXAMPLE SUPPLEMENTAL QUESTIONS

1. What is the total time that incumbents are on their feet (include standing and walking) in an average workday? (check one answer)

less than 1 hour _____

1-2 hours _____

3-4 hours _____

5-6 hours _____

7 or more hours _____

2. What is the total distance that incumbents walk in an average workday?

less than ½ mile _____

½ mile to 1 mile _____

1 ½ to 2 miles _____

2 ½ to 3 miles _____

more than 3 miles _____

EXAMPLE SUPPLEMENTAL QUESTIONS

3. When incumbents in the position you are rating lift objects weighing 50 lbs. or more, what percentage of the time did the incumbents lift the object without assistance versus with the assistance of a co-worker:

without assistance _____ %
with assistance _____ %

Total = 100 %

4. When incumbents in the position you are rating need to climb, what percentage of the time do the incumbents climb to the following heights:

less than 10 feet _____ %
10 – 19 feet _____ %
20 – 29 feet _____ %
30 feet or higher _____ %

Total = 100 %

5. When incumbents in the position you are rating need to lift and carry objects weighing 30 lbs. or more, what percentage of the time do the incumbents carry the objects the following distances:

less than 25 feet _____ %
25 – 50 feet _____ %
50 – 75 feet _____ %
76 – 100 feet _____ %
more than 100 feet _____ %

Total = 100 %

JOB ANALYSIS RESULTS

- Ability Analysis Results
 - Identify which abilities are required for what jobs
 - Determine the level of abilities needed for each job
 - Determine the similarity of jobs based upon required abilities and the level of abilities needed
 - Place jobs into groups based upon the ability analysis results

JOB ANALYSIS RESULTS

- Task Rating Results
 - If a common task list was used, the similarity of essential tasks among the jobs can be empirically determined
 - The number of common and unique essential tasks between two jobs are counted
 - These values are entered into a job similarity equation
 - The resulting value is the percent of overlap in essential tasks between the jobs
 - If the percentage is high, the jobs can be considered similar and the same test can be used for both jobs
 - Jobs with task similarity can use the same task based (job sample) or ability based tests

JOB ANALYSIS RESULTS

- Task Rating Results
 - If the job similarity percentage is low
 - The jobs are not similar in terms of tasks performed
 - However, the jobs may be similar in terms of required abilities and the same abilities tests may be used for the jobs

JOB SIMILARITY PERCENTAGES

	Positions					
	Cable Repair	Cable Splicing	Electronics Tech	Network Tech	Outside Plant	Service Tech
Cable Repair						
Cable Splicing	73.3					
Electronics Tech	29.1	22.9				
Network Tech	82.0	83.7	28.6			
Outside Plant	72.6	77.4	23.7	78.3		
Service Tech	84.6	66.1	30.3	76.6	67.9	

TEST DEVELOPMENT

- Two types of tests
 - Basic Ability
 - Job Sample/Simulation

TEST VALIDATION

- The job analysis results provide information supporting the validity of the tests
 - Ability Tests - Construct Validity
 - Tests assess abilities required by the jobs to perform essential tasks
 - Job Sample/Simulation Tests - Content Validity
 - Tests include essential tasks and conditions relevant to the job

CRITERION-RELATED TEST VALIDATION

- Benefits of a Criterion-related validation approach
 - Empirical Evidence of a Test's Validity
 - Empirical Evidence of a Test's Fairness to Protected Groups
 - Test and Criterion Data to Generate Accurate Passing Scores
 - Greater Legal Defensibility

CRITERION-RELATED TEST VALIDATION

- Steps to Conduct Criterion-related Validation Study
 - Develop job performance measure
 - Develop sampling plan
 - Collect test and job performance data
 - Data Analysis

JOB PERFORMANCE MEASURE

- Job performance measures provide the data needed to establish the relationship between test performance and job performance
 - Types of Job Performance Measures
 - Supervisor/Peer Ratings
 - Job Sample/Simulations
 - Archive Data (e.g., injury data, productivity data)

JOB PERFORMANCE MEASURE

- Requirements
 - Relevant for all participants
 - Relevant for all jobs in study
 - Sensitive to differences in performance across individuals
 - Measure important facets of the job related to the test (e.g., physical test – assess physical job performance)
 - Be available for all participants and allow for comparisons
 - Be fair to all participants

SUPERVISOR/PEER ABILITY RATING

Supervisor/Peer Rating Scale

- 5 = Above Average
- 4 = Slightly Above Average
- 3 = Average
- 2 = Slightly Below Average
- 1 = Below Average

1. Static Strength - The ability to use muscle force in the shoulders, upper back, arms, and legs to lift, push, pull, carry, or hold objects for a brief period of time (less than one minute).

Generic Examples:

Moderately high

Lift a 70-lb. box.

Low

Lift a package of bond paper.

Example Tasks:

Remove/replace manhole cover with manhole cover hook.

Push, roll, and turn large cable reels.

SUPERVISOR/PEER TASK RATING

1. Lift and carry equipment that weighs 60 – 75 lbs. 25 – 100 feet.
2. Dig holes or trenches with shovel.
3. Install/repair equipment while standing on ladder.
4. Set and raise extension ladders on buildings and poles.

JOB PERFORMANCE MEASURE

- Advantages of Supervisor/Peer Ratings
 - Ability ratings relevant for all participants and jobs requiring the abilities
 - The ratings for tasks specific to certain jobs can be transformed to allow for comparisons across jobs
 - Rating forms are easier to develop than some job samples
 - Both ratings and job samples have produced significant correlations with test scores
 - Job samples may not be applicable to all jobs

DEVELOP SAMPLING PLAN

- Select individuals from all jobs to participate in the data collection
- If there are job groupings, all jobs within each job grouping must be sampled
- Sample should contain adequate representation from protected groups in order to assess test fairness

VALIDATION DATA COLLECTION

- Individuals selected to participate in the data collection complete all tests and job sample criterion measures
- Supervisor(s) and co-workers of each participant complete supervisor/peer rating forms

VALIDATION DATA ANALYSIS

- Descriptive Statistics for Tests and Job Performance Measure Results
- Test – Job Performance Correlations
 - Establishes the validity of the tests
 - Computed for each job group

MULTIPLE REGRESSION

- Multiple Regression Analyses used to identify a test battery that is predictive of job performance
 - Separate regressions computed for each job group
- In numerous instances with physical abilities tests, most tests are found to be significantly related to job performance
 - Because of this, the same battery of tests can be valid and used for all job groups

MULTIPLE REGRESSION BENEFITS

- Identifies the validity of the entire test battery
- Helps prevent over and under testing
- Generates regression weights that maximize the predictability of the test battery
 - Especially important if a compensatory scoring approach is used
 - Regression weights specific to each job grouping can be used to generate combined scores that maximize predictability

Simplified Regression Weights:

Combined Test Score = ((2 * Arm Endurance) + (3 * Sit-Ups) + (1 * Trunk Pull))

TEST FAIRNESS ANALYSIS

- Test battery and job performance data are used to determine the generalizability of the tests to different subgroups (e.g., gender, ethnic, age)

GENERATION OF PASSING SCORES

- Depending on job analysis and validation results, different passing scores may be needed for the job groupings
 - For example,
 - If the abilities analysis means were higher for job group #1 than job group #2
 - If the supplemental questions indicate that the physical demands for job group #1 are greater than job group #2
 - The physical performance (test scores) for individuals in job group #1 is higher than job group #2

GENERATION OF PASSING SCORES

- Information used to determine if separate scores are needed and to generate passing scores
 - Job Analysis results – frequency of task performance, supplemental question results, ergonomic information
 - Abilities profiles – level of abilities required to perform essential job tasks
 - Test scores and job performance results
 - Pass and fail rates for potential passing scores
 - Anticipated level of adverse impact for potential passing scores

PASSING SCORES

	Simplified Regression Equation	Combined Passing Score	Multiple Hurdle Passing Scores			
			Sit-Ups	Arm End.	Arm Lift	Leg Lift
Job Group #1	$(52 \times \text{Sit-Ups}) + (19 \times \text{Arm Endurance}) + (34 \times \text{Arm Lift}) + (5 \times \text{Leg Lift})$	6427	14	133	43	135
Job Group #2	$(52 \times \text{Sit-Ups}) + (19 \times \text{Arm Endurance}) + (34 \times \text{Arm Lift}) + (5 \times \text{Leg Lift})$	5648	12	130	40	130
Job Group #3	$(47 \times \text{Sit-Ups}) + (18 \times \text{Arm Endurance}) + (36 \times \text{Arm Lift}) + (4 \times \text{Leg Lift})$	5625	12	130	40	130

TEST ADMINISTRATION

- Since the test battery is the same for all jobs, the same testing procedures can be used
- Separate passing scores or scoring equations may be applied to the test scores
 - Organizations can apply all passing scores to the candidate's test scores to determine what jobs the candidate is and is not qualified for