

Identifying and Developing Predictors of Job Performance

Patrick J. Curtin

Deborah L. Whetzel

Caliber Associates

Mid-Atlantic Personnel Assessment Consortium

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Agenda

- Introductions
- Test Plan
- Cognitive Ability
- Training and Experience
- Interviews

Introduction

- Who are we?
- Who are participants?

Test Plan



Test Plan – Overview

- Summarizes information from job analysis and literature review of assessment methods
- Provides a rationale for the use of particular test and assessment methods
- Provides a blueprint for the development and validation of tests and assessments

Test Plan - Process

- Steps
 - Conduct job analysis to identify KSAs
 - Identify potential measurement methods
 - Assess selection methods against psychometric and operational criteria
 - Create a KSA by method matrix
 - Determine how best to assess relevant KSAs

Test Plan – Centerpiece is the Matrix

- The matrix is used to link KSAs to measurement methods
 - KSAs are rows
 - Measurement methods are columns
 - Rater judgments are in the cells

Test Plan – Identifying KSAs

- Knowledge - A body of information applied directly to the performance of a function.
- Skills - A present, observable competence to perform a learned psychomotor skill.
- Abilities - A present competence to perform an observable behavior or a behavior which results in an observable product.

Example KSAs

- Example Managerial Knowledges
 - Knowledge of business management (such as quality control, human resource management)
 - Knowledge of math including addition, subtraction, multiplication, and division
- Example Managerial Skills
 - Skill in dealing with all types of people
 - Skill in managing own time and coordinating with others
- Example Managerial Abilities
 - Ability to have an impact on others in the organization and display energy and leadership
 - Ability to communicate information and ideas in speaking so others will understand

Test Plan – Identifying measurement methods

- Example measurement methods:
 - Cognitive ability
 - Training and experience
 - Interviews

Test Plan – Matrix Example

Selection Method → KSA ↓	Cognitive Ability	Training and Experience	Interviews
Knowledge of business management (such as quality control & human resource management)			
Knowledge of math including: addition, subtraction, multiplication, and division			
Skill in dealing with all types of people			
Skill in managing own time and coordinating with others			
Ability to apply separate pieces of information to solve complex problems			
Ability to communicate information and ideas orally so others will understand			

Test Plan

- Methods need to be assessed against Psychometric & Operational criteria
- Psychometric criteria
 - Reliability evidence
 - Validity evidence
 - Content validation support
 - Subgroup differences

Test Plan

- Operational criteria
 - Applicant acceptance
 - Resistance to compromise
 - Consistency of administration and scoring
 - Development cost
 - Development time
 - Operational cost

Test Plan - Selection Tools by Criteria Example

EVALUATION OF SELECTION TOOLS AGAINST CRITERIA														
Criteria ↓	Selection Tools													
	Measures of Basic Attributes		Measures of Background, Training, and Experience					Measures of Declarative Knowledge and Procedural Knowledge and Skill						
	Cognitive Ability	Personality	Accomplishment Record/Portfolio	Interview	Biodata	GPA	Task-based Questionnaire	Job Knowledge	SJT	Work Sample/Job Tryout	Role Play	Leaderless Group	In-basket	Essay
Validation Evidence	H	M	M	M	M	L	M	H	H	H	L	L	M	L
Content Validation Support	M	M	H	H	M	L	H	H	H	H	H	H	H	M
Reliability	H	H	M	M	M	H	H	H	M	H	M	M	M	M
Subgroup differences	H	L	L	L	L	H	M	M	M	L	L	L	M	H
Applicant acceptance	M	L	M	H	L	M	M	H	H	H	H	M	M	M
Resistance to compromise	H	L	H	M	M	H	M	H	M	H	L	M	M	M
Consistency of administration and scoring	H	H	M	M	H	H	H	H	H	M	L	L	M	M
Development cost	L	L	M	M	H	L	L	M	H	H	H	M	H	M
Development time	L	L	M	M	H	L	L	M	H	H	H	M	H	M
Operational cost	L	L	M	H	L	L	L	L	L	H	H	H	H	M

Test Plan Exercise: Completing the Matrix

Test Plan Exercise: Completing the Matrix

Selection Method → KSA ↓	Cognitive Ability	Training and Experience	Interviews
Knowledge of business management (such as quality control & human resource management)		✓	✓
Knowledge of math including: addition, subtraction, multiplication, and division	✓		
Skill in dealing with all types of people		✓	✓
Skill in managing own time and coordinating with others		✓	✓
Ability to apply separate pieces of information to solve complex problems	✓		
Ability to communicate information and ideas orally in a manner that is appropriate for the audience		✓	✓

Test Plan – Final Review

- Do the selection methods provide “coverage” of the KSAs?
- Are the Psychometric and Operational aspects of the chosen methods appropriate given the restrictions of a particular testing scenario?
- In what order should the methods be used?

Test Plan - Compromises

- To balance among competing concerns such as adverse impact and operational costs, the following should be considered:
 - Multiple hurdle approach
 - Whole job measurement approach

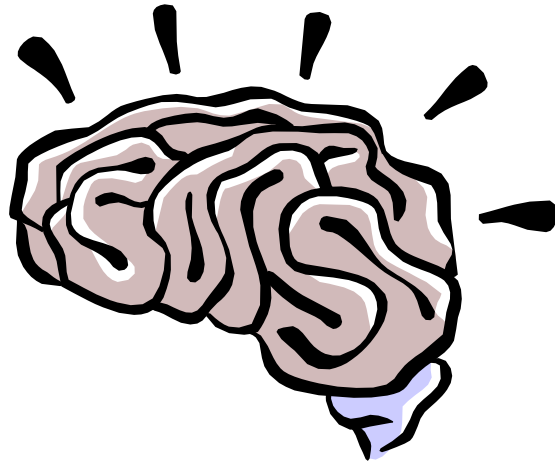
Test Plan – In Summary

- The final test plan...
 - identifies suitable measurement methods given a host of concerns and limitations
 - demonstrates the expected relationships between KSAs and measurement methods.
 - provides a blueprint for the development and validation of personnel selection procedures.

Test Plan – Discussion

- Have you ever created a test plan to identify tests to select people for a job?
- What issues did you encounter when using a test plan?

Cognitive Ability



Cognitive Ability

- Definition
 - Cognitive ability has been conceptualized in more than one way. The two main conceptualizations are based on cognitive ability being thought of as a unified whole “g” or thought of as a collection of intelligence facets.

Cognitive Ability

- Examples of Off-the-shelf Cognitive Ability Tests
 - The Wonderlic Personnel Test
 - Employee Aptitude Survey – a basic skills battery
 - Watson-Glaser Critical Thinking Appraisal
 - Wechsler Adult Intelligence Scale III
 - Raven’s Progressive Matrices
 - Stanford-Binet Intelligence Scale
 - Woodcock Johnson III Tests

Cognitive Ability

- How to Select a Cognitive Ability Test
 - Mental Measurements Yearbooks (University of Nebraska Press)
 - Tests in Print (University of Nebraska Press)
 - Test Critiques (Pro-Ed – Austin, TX)
 - Tests (Pro-Ed – Austin, TX)
 - A.P.A. (www.apa.org)
 - Test Publishers

Cognitive Ability

- Psychometric Characteristics
 - Reliabilities can range from the mid .80s to the low .90s (Hunter & Hunter, 1984; Schmidt & Hunter, 1998).

Cognitive Ability

- Psychometric Characteristics
 - Validity of cognitive ability tests to predict performance is approximately .51 (Hunter & Hunter, 1984; Schmidt & Hunter, 1998).

Cognitive Ability

- Psychometric Characteristics
 - Subgroup differences -- A difference of approximately one standard deviation has been repeatedly found between African Americans and White subgroups on cognitive ability testing (Hunter and Hunter, 1984; Jensen, 1980; Schmitt, Clause, & Pulakos, 1996).

Cognitive Ability

- Issues to Consider
 - Administration time
 - Special accommodations
 - Retesting policy

Cognitive Ability

- Reasons for developing a new cognitive ability test
 - Alternate forms are required
 - Tests become outdated
 - Client wants a proprietary test
 - Test for newly hypothesized or specialized ability

Cognitive Ability

- Steps for developing a new cognitive ability test
 - Develop test specifications
 - Create items
 - Conduct technical reviews
 - Conduct sensitivity reviews
 - Create test administration instructions
 - Conduct pilot test of items
 - Analyze item data
 - Select items and assemble test
 - Write documentation

Cognitive Ability - Discussion

- Have you ever used a cognitive ability test to select people for a job?
- What problems/resistance have you encountered when using cognitive ability to predict job performance?
- Are cognitive ability tests worth the hassle, or are there other measures that could be used that are just as effective?

Training and Experience Measures



Training and Experience

Background

- Training and experience (T&E) selection instruments are based on the notion that past behavior and experience are powerful predictors of future behavior (Ash, Johnson, Levine, & McDaniel, 1989).

Training and Experience

Scope of T&E's

- T&E's can be used to assess:
 - Prior work experience
 - Prior training
 - Overall knowledge, skills, and abilities (KSAs) gained from previous experiences

General Types of Experience Questionnaires

- Task-based questionnaire (TBQ)
 - Measures experience with tasks from job analysis
 - Assumes experience performing job tasks
 - Not usually appropriate for entry-level jobs
 - Minimal written communications skills required
 - Applicants indicate experience performing job tasks

General Types of Experience Questionnaires

- KSA based questionnaire (KSABQ)
 - Measures experience as indicator of KSAs.
 - No need for experience with specific tasks
 - Can be used for entry-level jobs
 - Minimal written communications skills required
 - Applicants indicate experience performing activities related to the job.

Training and Experience

Additional T & E methods

1. Holistic Judgment
2. Minimum Qualifications
3. Grouping Method
4. Point & Task Methods
5. Accomplishment Records

Training and Experience

1. Holistic Judgment

- Not a formally scored T&E evaluation method but rather a more general overview of an individuals resume.
- Lacks both structure and objectivity.

Training and Experience

2. Minimum Qualifications

- Semi-structured review of resume or application
- Identify minimum educational and experiential credentials
- Does not address variability in performance of those who pass
- Hard to equate education and experience across applicants

Training and Experience

3. Grouping Method

- Applicants are divided into a small number of groups on the basis of simultaneous consideration of training and experience.
- Rather than being ranked over a continuous range of scores, applicants assigned to each group are assigned to the same score.

Training and Experience

4.1 Traditional Point Method

- Consists of a mechanical formula set out in a formal schedule.
- The number of months or years of different types of relevant training, education, and experience are allotted a certain number of points.

Training and Experience

4.2 Improved Point Method

- Examines an applicants' specific job behaviors/duties as indicators of job-related KSAOs.
- Less arbitrary and a more adequate approach to assigning fairly specific point scores to applicants based on their individual backgrounds.

Training and Experience

5. Accomplishment Record Method -
a.k.a. Behavioral Consistency Method
 - Rank order applicants on the basis of the type of achievement behaviors that are necessary for optimum performance in the target job.
 - Focuses more on *quality* of experiences

Training and Experience

Psychometric Characteristics

- Past research has found interrater reliability estimates of T&E ratings were found to be around .80, which is quite desirable (Gatewood and Field, 1988).

Training and Experience

Psychometric Characteristics

- Meta-analyses yielded the following average estimated validities:
 - Behavioral consistency (.45)
 - Traditional point method (.11)

Developing a Task Based Questionnaire

-Using the Improved Point Method-

Basic Development Steps

- Identify genuine and counterfeit tasks
- Develop scoring system
- Pilot test form

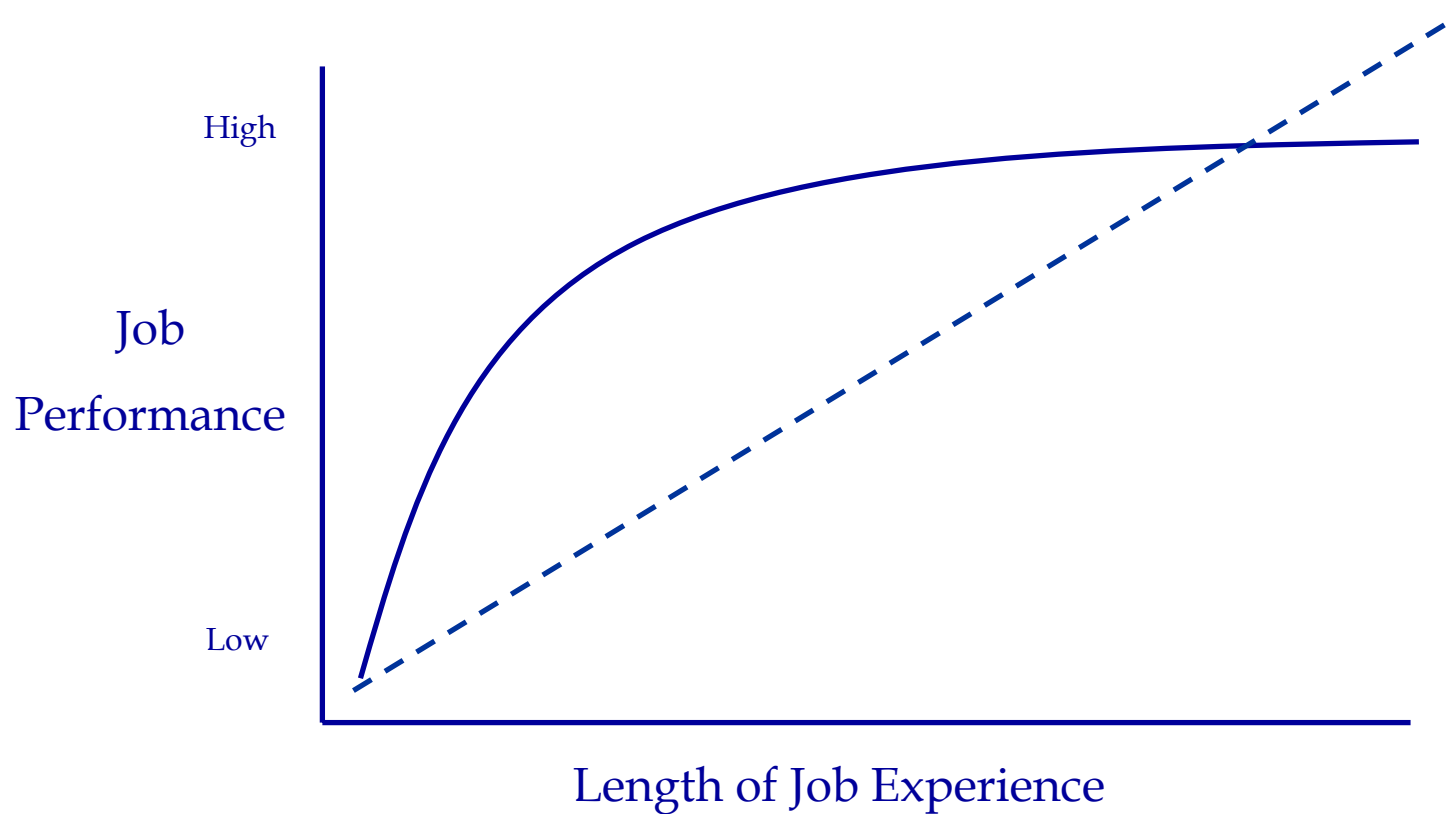
Identify Tasks

- Include tasks that are:
 - Critical
 - Needed-at-entry
- Limit TBQ to tasks that *qualified* applicants could have experience performing
- Develop counterfeit tasks

Develop Scoring System

- Award points for increasing amounts of experience with tasks
- Reflect the asymptotic relationship between experience and performance.
 - Estimate asymptotes based on job analysis and MQ data
 - SMEs review and adjust asymptotes
 - Assign points linearly below asymptote

Asymptotic Relationship Between Experience and Job Performance



Setting Performance Asymptote

- Difficult to estimate asymptote:
 - Some tasks may not have one.
 - Interpersonal KSAs.
 - Complex or rapidly changing jobs.
 - Many different routes.
 - Experience.
 - Education/training.
 - Hybrid (e.g. apprenticeships).
 - Does not account for individual differences.
 - Intelligence.
 - Openness to experience.

Exercise: Create Performance Asymptotes



Pilot Test TBQ

- Examine readability:
 - Flesch-Kincaid
 - Linguist
- SMEs participate in “think-aloud” workshop.
- SMEs try to identify counterfeit tasks.

Challenges

- Faking
- Collecting accurate/reliable information
- Setting performance asymptote
- Measuring education/training-based experience

Faking

- Three levels of protection:
 - Certification of information accuracy
 - Statement certifying veracity of responses.
 - TBQ lists penalties (e.g., dismissal) for falsification.
 - Verifiers
 - References that can support accuracy of information.
 - Counterfeit items
 - Nonsensical tasks that applicant could not perform.
 - Include multiple opportunities to “correct” responses.

Collecting Accurate/ Reliable Information

- Number of times is best predictor, but can be hard for the applicant to estimate.
 - Calculate from frequency and duration.
 - More verifiable.
 - Difficult when tasks/activities vary in frequency.

Collecting Accurate/ Reliable Information

Skill in repairing clocks				
Please rate your experience with each of the activities below:	How much work experience do you have performing this activity?			Who can verify your work experience with this activity?
	Duration		Frequency	
	Years	Months		
1. Replacing the batteries in clocks.			① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
2. Replacing the hands on a clock.			① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
3. Replacing the gears in a clock.			① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩	① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

0 = Never 1 = Quarterly 2 = Monthly 3 = Weekly 4 = daily 5 = more than once a day

Collecting Accurate/ Reliable Information

- Because number of times can be hard to estimate.
 - Provide anchoring examples.
 - More flexible.
 - Less verifiable.
 - Applicants may overlook them.

Collecting Accurate/ Reliable Information

Skill in Repairing Clocks					
Activity	Frequency	Examples			Verifier(s)
	How many times have you performed this activity? (Mark the option closest to your level of experience).	<i>To perform this activity the number of times listed in the option to the left, you'd have to perform the task...</i>			Who can verify your work experience with this activity? (Mark all corresponding verifier numbers that apply)
		<i>every day for about...</i>	<i>or every week for about...</i>	<i>or every month for about...</i>	
1. Replacing the batteries in a clock.	0 times	--	--	--	
	19 times	1 month	4 months	2 years	① ⑥
	38 times	2 months	9 months	3 years	② ⑦
	58 times	3 months	13 months	5 years	③ ⑧
	77 times	4 months	18 months	6 years	④ ⑨
	96 times or more	5 months or more	22 months or more	8 years or more	⑤ ⑩

Training and Experience Measures

Strengths and Weaknesses

- Show validity under specific conditions
- Can be developed for use in entry-level jobs
- Challenges in collecting useable data can be overcome

Training and Experience

Discussion

- Have you ever used training and experience measures to select people for jobs?
- What problems have you encountered in using T&Es?

Employment Interview



Employment Interview

- Definition
 - Interviews involve the exchange of information between an interviewer and an interviewee, either face to face, by telephone, or in writing.

Employment Interview

- Types of Interviews
 - Structured
 - Unstructured

Employment Interview

- Types of Questions
 - Situational
 - Past behavior

Employment Interview

- To improve quality of evaluation
 - Base questions on a job analysis
 - Ask exact same questions
 - Do not allow questions from candidate till end of interview
 - Rate each answer or use multiple scales
 - Take notes
 - Use multiple and same trained interviewers across candidates

Employment Interview

- Administration modes
 - Telephone interviews
 - Validity of a telephone-administered interview is comparable to face-to-face interviews.
 - Require no travel for the interviewer or interviewee and can result in significant cost savings for geographically dispersed employers.

Employment Interview

- Administration modes
 - Written structured interviews
 - Candidates provide written responses to questions; administered in a group setting
 - Require no travel for the interviewer or interviewee and can result in significant cost savings for geographically dispersed employers.

Employment Interview

- Psychometric Characteristics
 - Reliability .67 structured interviews
 - Reliability .84 job-related structured interviews
 - Reliability .68 job-related unstructured interviews

Employment Interview

- Psychometric Characteristics
 - Validity
 - Structured .44
 - Unstructured .33
 - Situational .50
 - Job-related .39
 - Psychological .29

Employment Interview

- Psychometric Characteristics
- Correlations with other constructs
 - High structure interviews focused more on applied mental skills, direct job knowledge, applied social skills and organizational fit.
 - Low structure interviews focused more on general mental ability, background credentials, some aspects of personality, and physical attributes.

Employment Interview

- Psychometric Characteristics
 - Research on subgroup differences has yielded mixed results

Employment Interview

- Psychometric Characteristics
- Incremental validity beyond GMA
 - Higher levels of structure result in greater incremental validity of GMA than lower levels of structure
 - Correlation of .40 between interviews and GMA shows that 16% of variance in interview represents cognitive ability

Employment Interview

- How to develop structured interviews
 1. SMEs review KSAs and describe incidents of effective and ineffective performance in writing.
 2. SMEs sort incidents into KSAs and rate the behaviors described in incidents for effectiveness (retranslation).
 3. Select incidents allocated to KSAs by 75% of SMEs and that have low SD on effectiveness (< 1.0).

Employment Interview

- How to develop structured interviews
 4. Write questions from the incidents retained from Step 3.
 5. SMEs think of people whose performance on the job they would rate as outstanding, average, and poor, and provide written narratives describing how those people would respond to each question.

Employment Interview

- How to develop structured interviews
 6. SMEs then rate the simulated responses and those responses on which there is a high degree of rater agreement are retained as anchors for a rating scale.


Employment Interview- Exercise

- Develop structured questions for Ability to have an impact on people in the organization.
- Develop anchors for Low, Medium and High levels of responses.

Employment Interview- Discussion

- Have you used structured interviews to select people for jobs?
- What problems have you encountered when using structured interviews?

Summary - what we covered

- Test Plan
- Cognitive Ability
- Training and Experience
- Interviews
- Questions 

Review – Any changes?

Selection Method → KSA ↓	Cognitive Ability	Training and Experience	Interviews
Knowledge of business management (such as quality control & human resource management)			
Knowledge of math including: addition, subtraction, multiplication, and division			
Skill in dealing with all types of people			
Skill in managing own time and coordinating with others			
Ability to apply separate pieces of information to solve complex problems			
Ability to communicate information and ideas orally so others will understand			