




WELCOME!




TALLINN UNIVERSITY OF TECHNOLOGY

**Assessment and Measurement
in Work and Organizational Psychology**
(HPP8370; 4,0 ECTS)




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Cognitive abilities

Mechanical aptitude and spatial ability testing. Multi-aptitude test batteries. Information processing tests. The assessment of creativity. Individual and organizational level intervention methods.



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Testing special abilities


Origins of vocational testing

During the economy depression years of the 1930s, when matters related to employment (or rather unemployment) became of great concern, research programs at the University of Minnesota resulted in construction of a series of special abilities tests for use in vocational counseling and in employee selection and placement. From these programs came not only numerous single-ability measures, but also batteries of tests

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Performance Tests

Performance tests = work sample tests = job replica tests



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Sensory-perceptual tests

Focus on visual and auditory discrimination

- ✓ Visual
- Acuity
- Color
- ✓ Auditory

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Sensory-perceptual tests

Visual acuity
For example:
Test Chart for Children

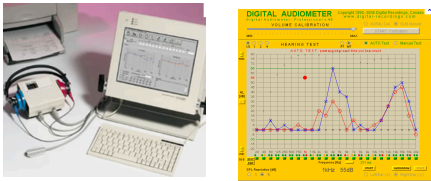
W	M	E	W	20/100		
3	W	M	3	W	M	30/10
M	3	M	E	W	3	35/5
M	W	3	E	W	3	30/5
E	M	3	E	W	E	20/5

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Sensory-perceptual tests

Auditory acuity - the clarity or clearness of hearing, a measure of how well a person hears

For example:
Auditory acuity is commonly determined with an audiometer

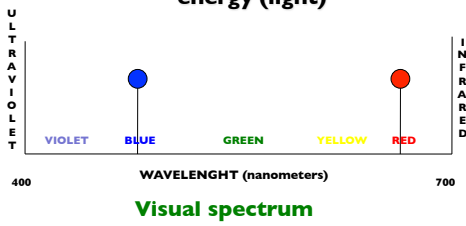


The image shows a physical audiometer on the left and a digital audiometer software interface on the right. The software interface displays a graph with frequency on the x-axis and decibels on the y-axis, showing hearing thresholds for different frequencies.

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Sensory-perceptual tests

The visible spectrum of electromagnetic energy (light)



The diagram shows the visible spectrum of light, ranging from 400 nanometers (violet) to 700 nanometers (red). The colors are labeled: VIOLET, BLUE, GREEN, YELLOW, and RED. The spectrum is bounded by ULTRAVIOLET on the left and INFRARED on the right.

Visual spectrum


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Sensory-perceptual tests

Color sensation

1. Blue
2. Red
3. Green
4. Violet
5. Yellow

Visual contrast effect

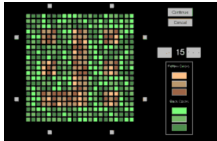
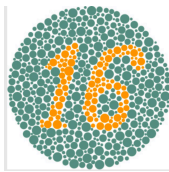


The image shows two test images. On the left is a blue square with the text "BLUE AND WHITE". On the right is a yellow square with a black and white spiral pattern.

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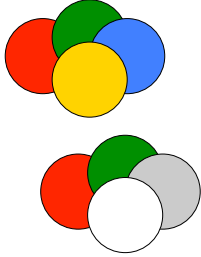
Sensory-perceptual tests

Color Blindness or Color Vision Deficiency (daltonism)
Color Vision Test (Shinobu Ishihara, 1879-1963)
On-line test <http://colorvisiontesting.com/ishihara.htm>




Dvorine Color Vision Test
from The Psychological Corporation

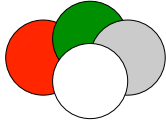
1. Normal



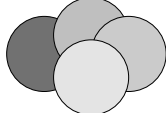
2. Does not differentiate red and green



3. Does not differentiate yellow and blue




4. Achromatic vision





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Multipurpose instruments

For example:
Reaction time to visual stimuli




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Tests for psychomotor abilities

Tests for psychomotor abilities attempt to measure the depth and nature of particular strengths and weaknesses in subject or job related areas

Typically these tests involve high level cognitive processing, are tasks which require some coordination of visual perception and motor performance. Some of these tests measures of the speed of performance, some of accuracy or of the quality of psychomotor performance


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Tests for psychomotor abilities

Fleishman (1972) identified 11 different psychomotor skills which could be tested:

- ✓ arm-hand steadiness
- ✓ control precision
- ✓ finger dexterity
- ✓ manual dexterity
- ✓ multilimb coordination
- ✓ rate control
- ✓ reaction time
- ✓ response orientation
- ✓ speed of arm movement
- ✓ wrist-finger speed

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Tests for psychomotor abilities

Fleishman also noted that the reliabilities for psycho-motor tests was typically lower than reliabilities associated with other tests of special abilities: The psychomotor tests he reviewed had average reliabilities ranging from 0.7 up to 0.88

One possible reason for this reduced reliability is that practice effects are very strong on psychomotor tests

Predictive validity of psychomotor tests is poor, partially due to the influence of practice on the test scores


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Tests for psychomotor abilities

✓ Large manual movements

Stromberg Dexterity Test (SDT): is a fast, objective means of measuring basic manual dexterity for positions such as laundry worker, punch press operator, machine molder, assembler, or welder


The SDT was developed as an aid in choosing workers for jobs which require speed and accuracy of arm and hand movements. The original model was constructed in 1945 and further research led in 1947, to the present model. The box containing the SDT materials is used for the administration of the test as well as for carrying and storing the test materials. When opened, it occupies approximately two by four feet of table space



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Tests for psychomotor abilities

For example:
Stromberg Dexterity Test (SDT)



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Tests for psychomotor abilities

✓ Large manual movements

- **Minnesota Manual Dexterity Test**

For example: Minnesota Manual Dexterity Test




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Tests for psychomotor abilities

✓Small Manual Tests

-**Hand Tool Dexterity Test or Purdue Pegboard:** is a dexterity test to aid in the selection of employees for industrial jobs such as assembly, packing, operation of certain machines, and other manual jobs. It measures dexterity for two types of activity: one involving gross movements of hands, fingers, and arms, and the other involving primarily what might be called "fingertip" dexterity

- Five separate scores can be obtained with the Purdue Pegboard: (1) right hand; (2) left hand; (3) both hands; (4) right plus left plus both hands (R+L+B); and (5) assembly




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Tests for psychomotor abilities

The **Purdue Pegboard** was standardized after extensive experimentation in numerous plants involving the testing of several thousand employees in a wide variety of industrial jobs. Dexterity tests, in both pegboard and other forms, have been in use for some time. The pegboard is equipped with pins, collars, and washers, which are located in four cups at the top of the board

For example: Hand Tool Dexterity Test or Purdue Pegboard




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Tests for psychomotor abilities

These tests called perceptual-motor, sensory-motor, visual-motor or psychomotor tests or hand-eye coordination tests

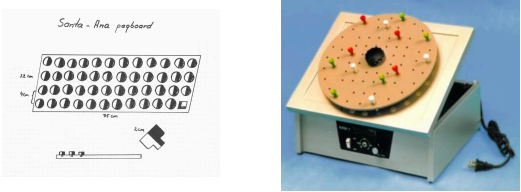
For example:
Reaction time to numeric stimuli



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Tests for psychomotor abilities

For example:
Santa Ana Form Board Test (psychomotor speed, coordination)



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Tests for psychomotor abilities

✓ Gross Motor Movement
– Flight simulators
See:
X-Plane 10: the most advanced flight simulator in the world
<http://www.x-plane.com/desktop/home/>

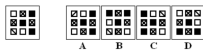
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Mechanical Tests

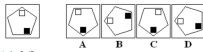
✓ Spatial Relations
– Usually physical assembly requiring manual dexterity and space visualization
– Physical assembly
For example:

Example Spatial Ability Test Questions

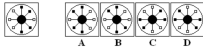
1) Which figure is identical to the first?



2) Which figure is identical to the first?



3) Which figure is identical to the first?


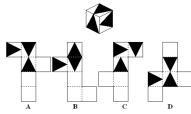


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Mechanical Tests

For example:

© 2001 pattern can be folded to make the cube shown?



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Mechanical Tests

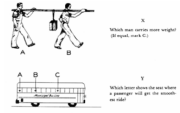
✓ Paper and pencil

– **Bennett Mechanical Comprehension Test:** Mechanical Aptitude tests are part of the selection process in a large array of jobs such: aircraft technician, auto mechanic, fire-fighter and more

The tests offered below will be especially effective in preparation for the Bennett Mechanical Comprehension test (BMCT)

<http://www.apititude-test.com/mechanical-aptitude.html>

For example: Typical Bennett Item





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Mechanical Tests

✓ Paper and pencil

– **Bennett Mechanical Comprehension Test:** is validated for use in many occupations, including: Automotive Mechanic, Engineer, Installation, Maintenance/Repair, Industrial/Technical Sales Representative, Skilled Tradesperson (e.g., Electrician, Welder, Carpenter), Transportation Trades/Equipment Operators (e.g. Truck Driver), Mechanical Trades, Automotive and Aircraft Mechanic


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Mechanical Tests


✓ Paper and pencil

– **Minnesota Paper Formboard Test** (*Rensis Likert and W. H. Quasha*)


The test consists of five figures and one of the figures displayed in disarranged parts. The subject has to decide which of the figures displays the pieces joined together


Measure aspects of mechanical ability requiring the capacity to visualize and manipulate objects in space

For example:



This assessment is used in determining which applicants have the aptitude for jobs requiring creativity and visualization skills, such as: designer, draftsman, electrician, engineer, technician


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Clerical Ability

✓ **Minnesota Clerical Test** (*D. M. Andrew, D. G. Paterson, and H. P. Longstaff*)

– 200 pairs of numbers and 200 pairs of names

Measure elements of perceptual speed and accuracy required when performing various clerical activities

For secretarial, clerical positions


<http://www.mdusd.org/personnel/Pages/ClericalSampleTest.aspx>


For example: Number and Letter Scramble

1. G-N-9-8-D-7-C-5

Your answer:

D-8-C-5-M-7
 N-5-D-9-7-C
 C-M-7-4-G-8
 6-D-G-N-9-5
 none of these



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Clerical Ability

Clerical Abilities Battery (7 tests a' 5-20 min; easy to administer and interpret, measure clerical speed, accuracy, and ability)


1. Filing
2. Copying Information
3. Comparing Information
4. Using Tables
5. Proofreading
6. Basic Math Skills
7. Numerical Reasoning


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Multiple Aptitude Test Batteries

Individual tests have different norm groups
Test batteries standardized on one norm group

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Differential Aptitude Test (DAT)

Designed to be used on school situations
Time: 3 hours

- Verbal Reasoning
- Numerical Ability
- Abstract Reasoning
- Space Relations
- Clerical Speed
- Mechanical Reasoning
- Language Usage

Good reliabilities, OK for academic use, limited vocational use,
significant gender differences


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General Aptitude Test Battery (GATB)

Designed for industrial application
Developed by the government and available through state agencies
Content: eight paper and pencil tests and four apparatus tests
Occupational Aptitude Pattern (OAP)

- Relevant to 60 job families


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General Aptitude Test Battery (GATB)


The GATB is used extensively in vocational counseling, rehabilitation, and occupational selection settings

The GATB profile of occupational aptitudes can be used to determine appropriate career and/or training paths

The GATB measures nine distinct aptitudes using 12 separate tests (eight pencil and paper tests, and four performance tests):


- G - General Learning Ability
- V - Verbal Aptitude
- N - Numerical Aptitude
- S - Spatial Aptitude
- P - Form Perception
- Q - Clerical Perception
- K - Motor Co-ordination
- F - Finger Dexterity
- M - Manual Dexterity



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General Aptitude Test Battery (GATB)

Minimum Qualifications to Purchase the GATB: M.A. Psychology or M.Ed. with at least 3 courses in testing and related subjects such as statistics, individual different OR successfully completed an approved GATB training course AND (in either case) a member of an organization with a code of ethics covering assessment practices


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Recommendations for further reading

Teichmann, M. (2009). Human Factors Engineering. Digital teaching Tool No 2. Sensation and Perception <http://www.enop.ee/tpi/digiopie/hfe/hfe2.htm>

Teichmann, M. (2009). Human Factors Engineering. Digital teaching Tool No 3. Attention and Memory <http://www.enop.ee/tpi/digiopie/hfe/hfe3.htm>

Teichmann, M. (2009). Human Factors Engineering. Digital teaching Tool No 4. Emotions <http://www.enop.ee/tpi/digiopie/hfe/hfe4.htm>

Hersen, M. (2004). *Comprehensive Handbook of Psychological Assessment: Industrial and organizational psychology*, Section one: Cognitive ability, pp. 21-74, John Wiley and Sons Inc.

Creative Organizational Design (tests) <http://www.creativeorgdesign.com/index.htm>

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Thank You!

mare@pekonsult.ee
