

## OVERVIEW

The field of assessment, particularly intellectual assessment, has grown tremendously over the past couple decades. New tests of cognitive abilities are rapidly being developed, and older tests of intelligence are being revised to meet the needs of the professionals utilizing them. There are many good sources for reviewing major measures of cognitive ability (Flanagan, Genshaft, & Harrison, 1997; Kaufman, in press; Kaufman & Lichtenberger, 1998; Sattler, 1988, 1992). However, the new and revised measures multiply rapidly, and it is often difficult to keep track of new instruments, let alone know how to administer, score, and interpret them. One of the goals of this book is to provide an easy reference source for those who wish to learn the essentials of the Wechsler Adult Intelligence Scale—Third Edition (WAIS-III) in a direct, no-nonsense, systematic manner.

*Essentials of WAIS-III Assessment* was developed with an easy-to-read format in mind. The topics covered in the book emphasize administration, scoring, interpretation, and application of the WAIS-III. Chapters include “Rapid Reference,” “Caution,” and “Don’t Forget” boxes, which highlight important points for easy reference. At the end of each chapter, questions are provided to help you solidify what you have read. The information provided in this book will help you to understand, in depth, the latest of the measures in the Wechsler family and will help you become a competent WAIS-III examiner and clinician.

For all cases presented in this book, the names and other pertinent identifying information have been changed to protect confidentiality of clients.

## HISTORY AND DEVELOPMENT

The first assessment instrument developed by David Wechsler came on the scene in 1939. However, the history of intelligence testing began several

decades before that, in the late 19th century, when Sir Francis Galton (1869, 1883) developed the first comprehensive test of intelligence (Kaufman, 1983). Galton's interest was in studying gifted people, and his theory was that since people take information in through their senses, the most intelligent people must have the best developed senses. As Galton was a strict scientist, he developed tasks that he could measure with accuracy. However, his sensory and motor tasks, though highly reliable, proved ultimately to have limited validity as measures of the complex construct of intelligence.

At the turn of the 20th century, Alfred Binet and his colleagues developed tasks to measure the intelligence of children within the Paris public schools (Binet & Simon, 1905). Binet had concluded that simple tasks like Galton's did not discriminate between adults and children and were not sufficiently complex to measure human intellect. Binet's tasks, primarily language oriented instead of nonverbal, like Galton's sensory-motor tasks, emphasized judgment, memory comprehension, and reasoning. In 1908 Binet revised his scale and included age levels ranging from 3 to 13 years; in its next revision in 1911, the Binet-Simon scale was extended to age 15 and included five ungraded adult tests (Kaufman, 1990).

Lewis Terman (1916) adapted and translated the Binet-Simon scale for use in the United States. Other Americans adapted Binet's test (e.g., Goddard, Kuhlmann, Wallin, and Yerkes), but only Terman had the foresight to adapt the French test to American culture (instead of virtual word-for-word translations) along with the insight and patience to obtain a careful standardization sample composed of American children and adolescents (Kaufman, in press). For more than 4 decades, Terman's Stanford-Binet and its revisions (Terman & Merrill, 1937, 1960) reigned as the most popular IQ test in the United States.

The assessment of children expanded rapidly to the assessment of adults when the United States entered World War I in 1917 (Anastasi & Urbina, 1997). There was a strong need for a method to select officers and place recruits. To meet the practical needs of the military, Arthur Otis (one of Terman's graduate students) helped to develop a group-administered IQ test, called the Army Alpha, which had verbal content quite similar to Stanford-Binet tasks. To assess immigrants who spoke little English, the group-administered Army Beta was developed, which consisted of nonverbal items. Ultimately, the individually administered Army Performance Scale Examination was developed by army psychologists to assess those who simply could

not be tested validly on the group-administered Alpha or Beta tests (or who were suspected of malingering). The nonverbal tasks included in the Beta and the individual examination had names (e.g., Picture Completion, Picture Arrangement, Digit Symbol, Mazes) that would become familiar to future generations of psychologists.

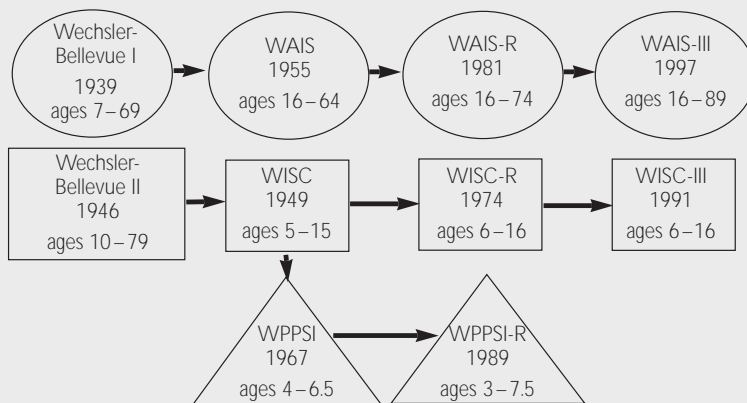
In the mid-1930s David Wechsler became a prominent player in the field of assessment by blending his strong clinical skills and statistical training (he studied under Charles Spearman and Karl Pearson in England) with his extensive experience in testing, which he gained as a World War I examiner. Wechsler's approach gave equal weight to the Stanford-Binet/Army Alpha system (Verbal Scale) and to the Performance Scale Examination/Army Beta system (Performance Scale). Wechsler created his battery with the idea that these tasks could be used to obtain dynamic clinical information extending well beyond their previous use as psychometric tests. The first in the Wechsler series of tests was the Wechsler-Bellevue Intelligence Scale (Wechsler, 1939), so named because Wechsler was the chief psychologist at Bellevue Hospital in New York City (a position he held from 1932 to 1967). That first test, followed in 1946 by Form II of the Wechsler-Bellevue, had as a key innovation the use of deviation IQs (standard scores), which were psychometrically superior to the MA/CA (mental age divided by chronological age) formula that Terman had used to compute IQ. The WAIS-III is the great-grandchild of the original 1939 Wechsler-Bellevue Form I; it is also a cousin of the WISC-III, which traces its lineage to Form II of the Wechsler-Bellevue.

The development of Wechsler's tests was not based on theory (except perhaps on Spearman's [1927] *g*, or general intelligence theory) but instead on practical and clinical perspectives. (The origin of each of the WAIS-III subtests is shown in Rapid Reference 1.1.) Wechsler's view of IQ tests was that they were a way to peer into an individual's personality. Years after the development of the Wechsler scales, extensive theoretical speculations have been made about the nature and meaning of these tests and their scores, but originally the tests were developed without regard to theory.

When put in historical perspective, Wechsler made some mighty contributions. His insistence that every person be assessed on both Verbal and Performance Scales went against the conventional wisdom of his time. Why, examiners asked, should we administer nonverbal tests to a person who speaks English well? Why spend 3 minutes administering a single Object Assembly

## DON'T FORGET

## History of Wechsler Intelligence Scales



Note. WPPSI = Wechsler Preschool and Primary Scale of Intelligence.

puzzle when you can give maybe 15 or 20 Information items in the same time frame? Yet discrepancies between Verbal and Performance IQs would prove to have critical value for understanding brain functioning and theoretical distinctions between fluid and crystallized intelligence. Furthermore, Wechsler's stress on the clinical value of intelligence tests would alter the face of intellectual assessment forever, replacing the psychometric, statistical emphasis that accompanied the use and interpretation of the Stanford-Binet. Finally, Wechsler's inclusion of a multiscore subtest profile (as well as three IQs instead of one) met the needs of the emerging field of learning disabilities assessment in the 1960s to such an extent that Wechsler's scales replaced the Stanford-Binet as the king of IQ during that decade. It has maintained that niche ever since.

The popularity of the revised WAIS (WAIS-R) is undisputed. Kaufman (1990) reported data from a survey of 402 clinical psychologists that showed 97% of these professionals utilized the WAIS or WAIS-R when administering an adult measure of intelligence. In a survey of graduate-level instructors, Oakland and Zimmerman (1986) found that the Wechsler instruments were those emphasized most heavily in instruction of assessment measures. Al-

## *Rapid Reference*

### 1.1 Origin of WAIS-III Subtests

<b>Verbal Subtest</b>	<b>Source of Subtest</b>
Vocabulary	Stanford-Binet
Similarities	Stanford-Binet
Arithmetic	Stanford-Binet/Army Alpha
Digit Span	Stanford-Binet
Information	Army Alpha
Comprehension	Stanford-Binet/Army Alpha
Letter-Number Sequencing	Gold, Carpenter, Randolph, Goldberg, & Weinberger (1997)
<b>Performance Subtest</b>	<b>Source of Subtest</b>
Picture Completion	Army Beta/Army Performance Scale Examination
Digit Symbol-Coding	Army Beta/Army Performance Scale Examination
Block Design	Kohs (1923)
Matrix Reasoning	Raven (1938)
Picture Arrangement	Army Performance Scale Examination
Symbol Search	Shiffrin & Schneider (1977) and S. Sternberg (1966)
Object Assembly	Army Performance Scale Examination

though many new instruments for measuring intellectual functioning have been developed in the past decade, the Wechsler scales are the most frequently used (Daniel, 1997). In light of clinicians' familiarity with and level of comfort with the WAIS-R, it is axiomatic that the new WAIS-III will be just as popular.

### PURPOSES OF ASSESSING ADULTS AND ADOLESCENTS

As mentioned earlier in this chapter, historically adults were assessed because of a need to place men into the appropriate level of the military service or to determine how mentally deficient a person was. Today reasons for assessing adolescents and adults commonly include measuring cognitive potential or

neurological dysfunction, obtaining clinical information, making educational or vocational placement decisions, and developing interventions for educational or vocational settings. Harrison, Kaufman, Hickman, and Kaufman (1988) found that practitioners who assess adults most often report using intelligence tests to measure cognitive potential and to obtain clinically relevant information. About 77% of practitioners reported using intelligence tests for obtaining information about neurological functioning, and under 50% reported using intelligence tests for making educational or vocational placements or interventions (Harrison et al., 1988).

## **FOUNDATIONS OF THE WAIS-III: THEORY AND RESEARCH**

Wechsler (1944) defined intelligence as “the capacity to act purposefully, to think rationally, and to deal effectively with his [or her] environment” (p. 3). His concept of intelligence was that of a global entity, which could also be categorized by the sum of many specific abilities. All of Wechsler’s adult tests from the Wechsler-Bellevue (1939) to the WAIS (1955) to the WAIS-R (1981) take the same basic form, with several subtests each composing the Verbal and Performance Scales, and the global entity of intelligence characterized by the Full Scale IQ. The WAIS-III continues in the same Wechsler tradition but includes some improvements on the basic structure, which are described in the following pages.

### **Description of WAIS-III**

Several issues prompted the revision of the WAIS-R, and the manual clearly details these and the changes that were made (Wechsler, 1997, pp. 8–14). Rapid Reference 1.2 lists key features that were adapted for the third edition.

In the WAIS-III, many of the core Wechsler subtests will be recognized by WAIS-R examiners, but there have also been several notable changes with the addition of new subtests and modifications to the overall structure. There are three new subtests.

- Matrix Reasoning (added to the Performance Scale to replace Object Assembly)

## *Rapid Reference*

### **1.2 WAIS-III Key Revisions**

- updating of norms
  - extension of the age range to 89 years (WAIS-R upper limit was 74 years)
  - modification of items
  - updating artwork on Picture Completion, Picture Arrangement, and Object Assembly
  - extension of floor
  - decreased reliance on timed performance for computing Performance IQ (by replacing Object Assembly with Matrix Reasoning and by decreasing the number of items with time-bonus points)
  - enhancement of fluid reasoning measurement by adding Matrix Reasoning subtest
  - strengthening the framework based on factor analysis
  - statistical linkage to other measures of cognitive functioning and achievement
  - extensive testing of reliability and validity
- 
- Symbol Search (added to the Performance Scale as a supplementary subtest)
  - Letter-Number Sequencing (added to the Verbal Scale as a supplementary subtest)

In addition to these three new subtests (see Rapid Reference 1.3 for a description), optional procedures have been added to the Digit Symbol-Coding subtest (previously named Digit Symbol), which were developed to help examiners assess what skills (or lack thereof) may be impacting examinees' performance on the subtest. These optional procedures involve recalling shapes from memory (Pairing and Free Recall) and perceptual and graphomotor speed (Digit Symbol-Copy).

The major structural change in the WAIS-III is the addition of index scores. The WAIS-III comprises four factor indexes, similar to its child counterpart, the Wechsler Intelligence Scale for Children—Third Edition (WISC-III), although there are notable differences between WISC-III and WAIS-III factors. Most factor-analytic studies of the WAIS-R had shown a model with

## *Rapid Reference*

### 1.3 New WAIS-III Subtests

<b>New Subtest</b>	<b>Description</b>	<b>Measures</b>
Matrix Reasoning	26 items containing incomplete gridded patterns that the examinee completes by choosing from five possible choices	Visual information processing, abstract reasoning skills, fluid reasoning, and simultaneous processing
Symbol Search	60 items consisting of paired groups of symbols; the examinee indicates whether the target symbol appears in the search group of symbols	Visual processing speed, planning, and perceptual organization
Letter-Number Sequencing	21 trials requiring the examinee to order sequentially a series of letters and numbers orally presented in a mixed-up order	Working memory, attention, and sequencing ability

three factors (Leckliter, Matarazzo, & Silverstein, 1986), whereas the WISC-III displayed a four-factor structure (Kaufman, 1994; Wechsler, 1991). A goal for the WAIS-III was to have subtests that would relate to four hypothesized factors: Verbal Comprehension, Perceptual Organization, Working Memory, and Processing Speed. The results of factor analyses from the WAIS-III standardization data did, in fact, support this four-factor model of the test. The addition of the four factor indexes to the psychometric profile is a plus when it comes to understanding how to interpret individual profiles.

As was true for the WISC-III, the framework of the WAIS-III was expanded to encompass one more tier of scores with the inclusion of the factor indexes (Figure 1.1). Eleven of the 14 WAIS-III subtests are used to create the four factor indexes. Comprehension, Picture Arrangement, and Object Assembly are not included in calculation of any of the index scores. Like the IQs, the indexes have a mean of 100 and a standard deviation of 15. The *WAIS-III and WMS-III Technical Manual* (The Psychological Corporation,

1997) has reported the details of several exploratory and confirmatory factor analysis studies that support the underlying four-factor structure of the WAIS-III. For most ages there is strong support for the four-factor structure, but for ages 75 to 89 the Perceptual Organization factor was not strongly supported. Most of the Performance subtests joined the Processing Speed Index, and only Matrix Reasoning had a loading above .40.

The relationship between the WAIS-III and its predecessor, the WAIS-R, was examined in a sample of 192 adults aged 16 to 71 (Wechsler, 1997). Each test was administered in a counterbalanced order with a 2- to 12-week interval between testings. The overall correlation coefficients showed that the Ver-

## DON'T FORGET

### New WAIS-III Four-Factor Structure

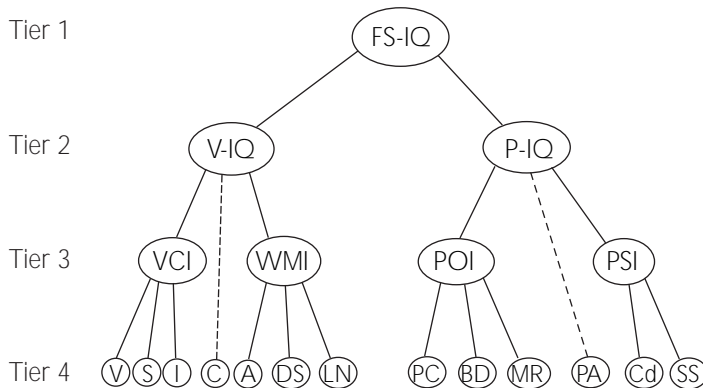
#### Verbal

1. Verbal Comprehension
3. Working Memory

#### Performance

2. Perceptual Organization
4. Processing Speed

**Figure 1.1 WAIS-III Structure: Four-Tier Hierarchy**



*Note.* FS-IQ = Full Scale IQ; V-IQ = Verbal IQ; P-IQ = Performance IQ; VCI = Verbal Comprehension Index; WMI = Working Memory Index; POI = Perceptual Organization Index; PSI = Processing Speed Index; V = Vocabulary; S = Similarities; I = Information; C = Comprehension; A = Arithmetic; DS = Digit Span; LN = Letter-Number Sequencing; PC = Picture Completion; BD = Block Design; MR = Matrix Reasoning; PA = Picture Arrangement; Cd = Digit Symbol-Coding; SS = Symbol Search. Object Assembly can substitute for a Performance subtest for ages 16 to 74.

**Table 1.1 Changes in Scores From the WAIS-R to the WAIS-III**

Scale	WAIS-R		WAIS-III		WAIS-R Minus WAIS-III IQ	WAIS-R to WAIS-III Correlation <sup>b</sup>
	<i>M</i> <sup>a</sup>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Verbal IQ	103.4	14.5	102.2	15.1	+1.2	.94
Performance IQ	108.3	14.4	103.5	15.4	+4.8	.86
Full Scale IQ	105.8	14.3	102.9	15.2	+2.9	.93

*Note.*  $N = 192$ . Correlations were computed separately for each order of administration in a counterbalanced design and corrected for the variability of the WAIS-III standardization sample (Guilford & Fruchter, 1978).

<sup>a</sup> The values in the mean columns are the average of the means of the two administration orders.

<sup>b</sup> The weighted average was obtained with Fisher's  $z$  transformation.

bal IQs for the WAIS-III and WAIS-R were the most highly related ( $r = .94$ ) of the global scales, followed by the Full Scale IQ ( $r = .93$ ) and the Performance IQ ( $r = .86$ ). As shown in Table 1.1, the average WAIS-III Full Scale IQ is 2.9 points lower than the WAIS-R Full Scale IQ. The difference between the two instruments on the Verbal IQ is small (1.2 points) and is lower on the WAIS-III. On the Performance Scale, the average WAIS-III IQs were 4.8 points less than on the WAIS-R. These differences are similar to what has been found in comparisons of other tests with their revised versions (Flynn, 1987) and indicate that when an examinee's performance is referenced to outdated norms (WAIS-R) rather than to current ones (WAIS-III), the IQ score may be inflated.

### Standardization and Psychometric Properties of the WAIS-III

The standardization sample for the WAIS-III ( $N = 2,450$ ) was selected according to 1995 U.S. census data, and was stratified according to age, sex, race/ethnicity, geographic region, and education level. Thirteen age groups were created from a large sample of adolescents and adults, with 100 to 200 subjects in each group between the ages of 16 to 17 and 85 to 89. The average split-half reliability for the IQs across the 13 age groups was strong,

ranging from .94 to .98 (see Rapid Reference 1.4 for split-half and test-retest reliability for all scales and subtests). The factor indexes had average reliability coefficients ranging from .88 for Processing Speed to .96 for Verbal Comprehension. Individual subtest reliabilities ranged from an average of .93 on Vocabulary to .70 on Object Assembly; median values were .88 for the seven Verbal subtests and .83 for the seven Performance subtests. A subset of the standardization sample (394 adults) provided test-retest data, with an average of 5 weeks between testings. The results of the test-retest study showed that for the four subsamples (19–29, 30–54, 55–74, and 75–89 years), reliability coefficients ranged from .94 to .97 for Verbal IQ, .88 to .92 for Performance IQ, and .95 to .97 for Full Scale IQ (see Rapid Reference 1.4).

One of the criticisms of the WAIS-R was that the norms for ages 16 to 19 were suspect (Kaufman, 1983, 1990). The two age groups (16–17 and 18–19) earned nearly identical scores on the WAIS-R, although the 18- to 19-year-olds have more formal education than the 16- to 17-year-olds, and IQ is substantially related to educational attainment. Further questions were drawn about the WAIS-R norms for individuals under age 20 because these young adults scored strikingly lower than did the individuals who were aged 20 to 24. Kaufman (1990) hypothesized that the problem with the WAIS-R norms for ages 16 to 19 was likely due to some sort of unknown sampling bias.

Kaufman (1999b) examined the WAIS-III standardization data to determine whether the norms seemed valid for the 16- to 19-year-olds. He used a procedure that involved the special reference group of 20- to 34-year-olds, thereby permitting comparisons across age groups. He observed expected increases in test scores from ages 16 to 17 to ages 18 to 19. However, from ages 18 to 19 to ages 20 to 24 there was no increase at all. Many more individuals in the 20 to 24 age range have attended college than among those in the 18 to 19 age range, which makes the lack of difference between the groups on WAIS-III tasks (especially on the Verbal Scale) surprising. Although questions are again raised about the norms for the youngest age groups in the standardization sample, our conclusion is that the norms for 16- to 19-year-olds are probably valid, especially for ages 16 to 17 years.

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## *Rapid Reference*

### 1.4 Average WAIS-III Reliability

<b>WAIS-III Scale, Index, or Subtest</b>	<b>Split-Half Reliability</b>	<b>Test-Retest Reliability</b>
Verbal IQ	.97	.96
Performance IQ	.94	.91
Full Scale IQ	.98	.96
Verbal Comprehension Index	.96	.95
Perceptual Organization Index	.93	.88
Working Memory Index	.94	.89
Processing Speed Index <sup>a</sup>	.88	.89
Vocabulary	.93	.91
Similarities	.86	.83
Arithmetic	.88	.86
Digit Span	.90	.83
Information	.91	.94
Comprehension	.84	.81
Letter-Number Sequencing	.82	.75
Picture Completion	.83	.79
Digit Symbol-Coding <sup>a</sup>	—	.86
Block Design	.86	.82
Matrix Reasoning	.90	.77
Picture Arrangement	.74	.69
Symbol Search <sup>a</sup>	—	.79
Object Assembly	.70	.76

<sup>a</sup>For Digit Symbol-Coding and Symbol Search and the composite of these two (Processing Speed), only test-retest coefficients are reported because of the timed nature of the subtests.

## Rapid Reference

### 1.5 Wechsler Adult Intelligence Scale—Third Edition

**Author:** David Wechsler

**Publication date:** 1997

**What the test measures:** Verbal, nonverbal, and general intelligence

**Age range:** 16–89 years

**Administration time:** 11 subtests to obtain IQs = 60–90 minutes, 13 subtests to obtain both IQs and Index scores = 65–95 minutes (Object Assembly adds an additional 10–15 minutes)

**Qualification of examiners:** Graduate- or professional-level training in psychological assessment

**Publisher:** The Psychological Corporation  
555 Academic Court  
San Antonio, TX 78204-2498  
Ordering phone number: 800-211-8378  
<http://www.PsychCorp.com>  
WAIS-III Complete kit test price = \$595 (as of April 1998)

### COMPREHENSIVE REFERENCES ON TEST

The *WAIS-III Administration and Scoring Manual* (Wechsler, 1997) and the *WAIS-III and WMS-III Technical Manual* (The Psychological Corporation, 1997) currently provide the most detailed information about the WAIS-III. These manuals review the development of the test; descriptions of each of the subtests and scales; and their standardization, reliability, and validity. *Assessing Adolescent and Adult Intelligence* (Kaufman, 1990) provides an excellent review of the research on the WAIS-R, much of which is still pertinent for the WAIS-III. Rapid Reference 1.5 provides basic information on the WAIS-III and its publisher.

 **TEST YOURSELF** 

- 1. Many of the tasks that David Wechsler used in his WAIS, WAIS-R, and WAIS-III were adapted from what sources?**
- 2. The WAIS-III is based on what theory?**
  - (a) Horn's fluid-crystallized theory
  - (b) the verbal-nonverbal theory
  - (c) Galton's sensory-motor theory
  - (d) none of the above, as Wechsler used a practical clinical approach rather than theoretical
- 3. What was the major structural change implemented from the WAIS-R to the WAIS-III?**
- 4. Which three subtests are not included in any of the four WAIS-III factors?**
  - (a) Block Design, Object Assembly, Comprehension
  - (b) Picture Arrangement, Comprehension, Object Assembly
  - (c) Digit Symbol-Coding, Picture Arrangement, Digit Span
  - (d) Object Assembly, Matrix Reasoning, Comprehension
- 5. Which subtest is not new to the WAIS-III?**
  - (a) Letter-Number Sequencing
  - (b) Object Assembly
  - (c) Matrix Reasoning
  - (d) Symbol Search
- 6. Which subtest has added two new optional procedures?**
  - (a) Digit Span
  - (b) Object Assembly
  - (c) Digit Symbol-Coding
  - (d) Picture Arrangement
- 7. For which age group was the Perceptual Organization factor not strongly supported?**
  - (a) 16–19
  - (b) 20–34
  - (c) 35–54
  - (d) 55–74
  - (e) 75–89

*Answers:* 1. Army Alpha, Army Beta, Army Performance Scale Examination, and Stanford-Binet; 2. d; 3. Addition of four factor indexes; 4. b; 5. b; 6. c; 7. e