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PREVIEW

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**Comparison of factor scores and area standard age scores of  
the Stanford-Binet Intelligence Scale: Fourth edition and their  
utility in discriminating among various subgroups**

**Valentic, Darralynn B., Ph.D.**

**The University of Nebraska - Lincoln, 1991**

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PREVIEW

COMPARISON OF FACTOR SCORES AND AREA STANDARD AGE SCORES  
OF THE STANFORD-BINET INTELLIGENCE SCALE: FOURTH EDITION  
AND THEIR UTILITY IN DISCRIMINATING AMONG VARIOUS SUBGROUPS

by

Darralynn B. Valentic

A DISSERTATION

Presented to the Faculty of

The Graduate College in the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Major: Interdepartmental Area of Psychological & Cultural Studies

Under the Supervision of Professor J. Michael Leibowitz

Lincoln, Nebraska

May, 1991

COMPARISON OF FACTOR SCORES AND AREA STANDARD AGE SCORES  
OF THE STANDFORD-BINET INTELLIGENCE SCALE: FOURTH EDITION  
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Darralynn B. Valentic, Ph.D.

University of Nebraska, 1991

Adviser: J. Michael Leibowitz, Ph.D.

Standardized intellectual assessment is a required component of many psycho-educational evaluations based on state guidelines which regulate the identification of handicapping conditions and subsequent provision of special education services. Although the professional literature is replete with studies related to many of the traditional intellectual assessment instruments, few have investigated the Stanford-Binet Intelligence Scale: Fourth Edition with specific diagnostic groups. The purpose of the present study was to investigate differences in the performance of four groups of children ranging from seven through twelve years-of-age and to determine if the Stanford-Binet: Fourth Edition area and factor scores were useful in differentiating among these populations. These groups included children identified as learning disabled,

mentally disabled, behavior disordered, and non-handicapped. Two analyses of variance were conducted to determine mean differences on (a) factor scores computed according to Sattler's method (Sattler, 1988) and (b) area scores described in the scoring guide (Thorndike, Hagen, & Sattler, 1986). Significant interactions were found for group and area and group and factor, and additional simple effects analyses were completed. Discriminant and classification analyses were utilized to investigate the relationships between area scores and group, and factor scores and group. Findings indicated that both area and factor scores correctly classified individuals at a higher rate than predicted by chance.

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Darralynn B. Valentic

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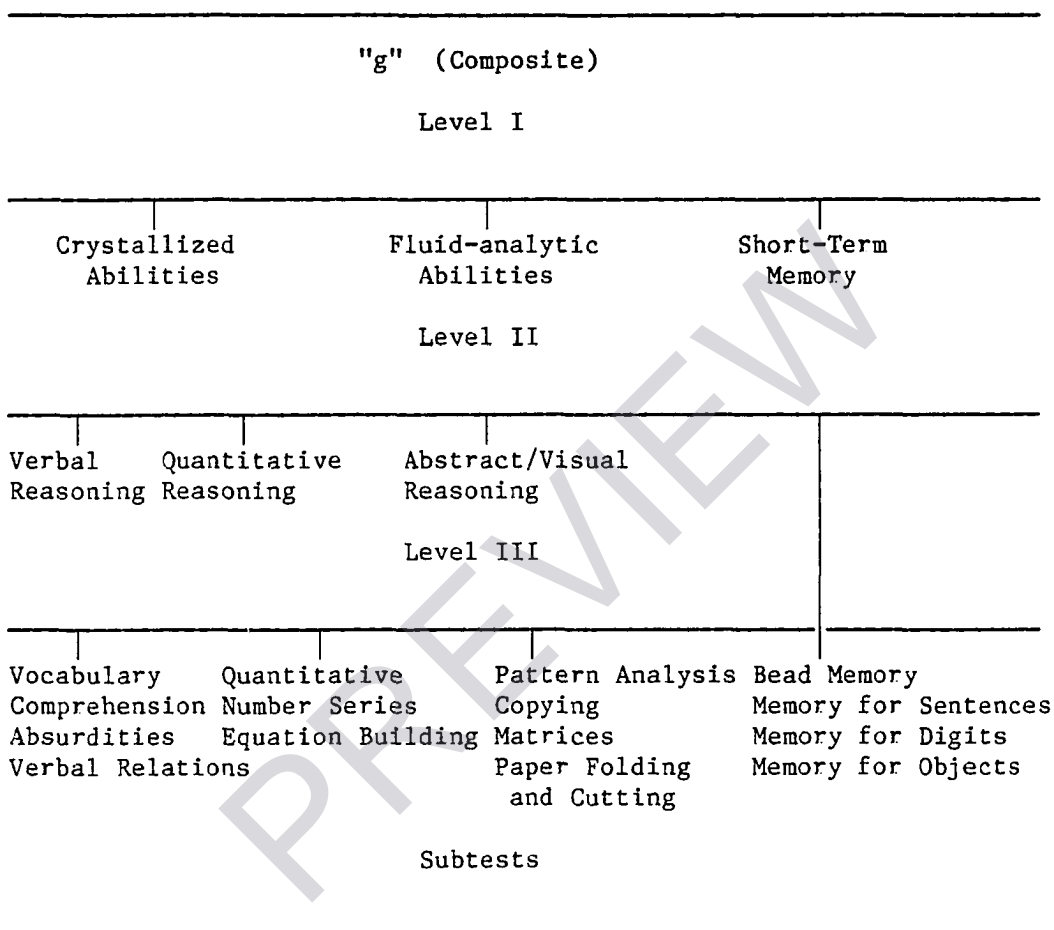
## Introduction

### Test construction

The Stanford-Binet Intelligence Scale is a broadly applicable, widely accepted measure of intelligence that has been utilized in school and clinical settings since the early part of the century. A recent revision of this Scale, the Stanford-Binet: Fourth Edition (SBFE), was published in 1986 by Riverside Publishing Company, following major reformulations and changes in structure and content (Thorndike, Hagen, & Sattler, 1986a). Although the SBFE continues to provide a Composite score that represents general reasoning ability, four areas of cognitive ability are assessed: Verbal Reasoning, Quantitative Reasoning, Abstract/Visual Reasoning, and Short-Term Memory. The decision to appraise four areas was a direct effort to assess cognitive abilities without the previous emphasis on verbal skills, and to maximize intra-individual differences; and, is probably the most fundamental change associated with the SBFE. A hierarchically arranged three-level model was adopted for the new edition (see figure 1), which expands its theoretical base. At the first level is "g" (general reasoning ability), with three broad factors at level II--Crystallized Abilities, Fluid-Analytic Abilities, and Short-Term Memory. The first two factors are founded in the Cattell-Horn theory of intelligence (Cattell, 1940; Horn, 1968; Horn & Cattell, 1966). The Short-Term Memory factor, though not included in the Cattell-Horn theory, was included in the model

Figure 1

Hierarchical Model of Cognitive-Abilities Factors Appraised in  
the Stanford-Binet Intelligence Scale: Fourth Edition



on the basis of factor-analytic findings with other instruments and the established link between memory and learning (Glutting & Kaplan, 1990; Thorndike, Hagan, & Sattler, 1986b, 1986c). Crystallized Abilities are subdivided into Verbal Reasoning and Quantitative Reasoning. Under Fluid-Analytic Abilities is Abstract/Visual Reasoning. The Verbal Reasoning, Quantitative Reasoning, and Abstract/Visual Reasoning Abilities are the specific factors which comprise Level III of the SBFE model of intelligence.

#### Previous research

Because the SBFE is essentially a new instrument, research up to this point has been limited. The Technical Manual describes three types of studies carried out to demonstrate the construct validity of the SBFE. Included were factor analytic studies; correlational studies with non-exceptional samples and examinees designated by school or institutions as gifted, learning disabled, and mentally retarded; and investigations of differences in performance by examinees in special groups. According to the authors, the results of these studies provided good support for the theoretical basis of the test, strong correlations with other measures of intelligence, and reliable discrimination power with exceptional examinees (Thorndike, Hagen, & Sattler, 1986c). Delaney and Hopkins (1987) described two sets of predictive validity studies which followed publication of the Technical Manual. These studies included non-exceptional and emotionally

disturbed samples and provided correlations between scores on the SBFE and several measures of academic achievement.

#### Correlational Studies--Non-Exceptional

Five correlational studies were carried out to determine the relationship between the SBFE and other individual intelligence tests. The socio-economic backgrounds for these subjectss had higher than average parental occupational and educational levels. The first study described in the Technical Manual looked at correlations between the SBFE and form L-M of the Stanford-Binet Intelligence Scale. The mean Composite Score was 105.8 with a standard deviation of 14.8 versus the mean Total Score on Form L-M of 108.1 with a standard deviation of 16.7. The authors found the expected pattern of correlations with Verbal Reasoning, Quantitative Reasoning, and Short-Term Memory area scores. The Composite score correlated more highly with the Total L-M score than with the Abstract/Visual Reasoning area score.

A second study was carried out to determine the correlation between the SBFE and the Wechsler Intelligence Scale for Children-Revised (WISC-R). The mean Full Scale IQ on the WISC-R was 105.2, and the mean Composite score on the SBFE was 102.4. Although the authors predicted that the scores on the Verbal Reasoning, Quantitative Reasoning, and Short-Term Memory areas would have higher correlations with the Verbal Scale and Full Scale WISC-R scores than with the Performance Scale, they found

correlations of equal magnitude. The Composite score on the SBFE correlated highly with all WISC-R Scale scores.

The WPPSI was the instrument compared to the SBFE in a third correlational study presented in the Technical Manual. The predicted pattern of correlation was the same as the WISC-R comparison previously mentioned. However, in this study, the results supported the authors' predictions. The Verbal Reasoning, Quantitative Reasoning, and the Short-Term Memory areas of the Stanford-Binet correlated more highly with the Verbal Scale of the WPPSI than with the Performance Scale. The WPPSI Performance Scale IQs correlated more highly with the Abstract/Visual Reasoning area of the SBFE.

The mean Composite score in the fourth study presented in the Technical Manual was 98.7, and the mean for the Wechsler Adult Intelligence Scale-Revised (WAIS-R) Full Scale IQ was 102.2. Similar parental educational and occupational levels existed for the sample in this study as the previously mentioned studies. In fact, a high percentage of the parents were college graduates and in managerial or professional occupations. The pattern of the correlations among scores on the SBFE and the scores on the WAIS-R was the same as that found for the WISC-R. The final study with a non-exceptional sample correlated the SBFE with the Kaufman Assessment Battery for Children (K-ABC). The Technical Manual reported that the examinees were very heterogeneous in their performance on these two measures, with standard deviations much