Running Header: IQ ASSESSMENTS

IQ Assessments and cultural considerations: WAIS-III/WISC-III and Sanford-Binet (SB5)

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Abstract

Intelligence and its assessment is a vital aspect of psychology. Today's testing involves consideration of various cultures, socioeconomic background, ages and gender. This study reviewed The Wechsler Intelligence Scales (WAIS-III/WISC-III) and the Stanford-Binet Fifth Edition (SB5) as intelligence assessment tools. The cultural considerations of these instruments from both a child and an adult perspective provide further insight into the ability to truly determine an individual's cognitive abilities and intelligence.

Table of Contents

IQ Assessments and cultural considerations: WAIS-III/WISC-III and Sanford-Binet (SB5)

Throughout history, philosophers and psychologists debated the concept of intelligence (Cohen & Swerdlik, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003; Weiten, 2004). In addition to the various expert definitions provided by Binet (1905), Terman (1911; 1916) and Wechsler (1939; 1975), the concept of intelligence also varies by one's culture. In some cultures such as China and Jamaica, conformity lies at the center of one's culture (Bagley, 1995; Ryan, Dai, & Paolo, 1995). This cultural attribute can significantly alter one's concept of intelligence as an internal process, rather than an external process (Georgas, Weiss, van de Vijer, Saklofske, 2003). In today's debates over intelligence, mixture includes concepts such as social and emotional intelligence (Cantor & Kihlstrom, 1987; Goleman, 1995). The further delineation of intelligence can greatly benefit from a holistic perspective. This study provides some clarification on the concept of intelligence.

While the complexity has grown over time, the various attempts to measure intelligence have progressed significantly since 1905. From the Binet-Simon Scale to the Wechsler-Bellevue Scale, standardization procedures and sustentative research have improved intelligence assessment tools greatly. With excellent reliability and validity, the popularity of today's instruments gives birth to what seems an endless ocean of applications. These applications range in population from children as early as 2 years old to adults as late as 96 years of age. In addition to age groups, cultural, socioeconomic and geographical groups have shown to have an impact on intelligence (Cohen & Swerdlik, 2004; Weiten, 2004). The vast range of applications include alcoholism, job placement, medical and educational treatment, legal proceedings and many more (Nigg, Glass & Wong, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003;

Kaufman & Lichtenberger, 1999; Roid & Barram, 2004; Weiten, 2004). This study presents an overview of two commonly used and historic intelligence assessment tools: the Stanford-Binet Intelligence Scale, Fifth Edition (SB5) and the Wechsler Intelligence Scales (WAIS-III and WISC-III). Furthermore, the study takes a high-level overview at the specific cultural challenges that exist within a fast moving economy (Cohen & Swerdlik, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003; Weiten, 2004).

Historical overview

Intelligence is a complex concept. A general definition of intelligence may include abilities such as the ability to reason logically, to plan effectively, or to obtain and apply certain knowledge (Cohen & Swerdlik, 2004). This generalized definition has come a long way since the initial debates about intelligence began.

Definition of Intelligence

As early as 1869, Galton felt that intelligence is a trait passed down through inheritance. He believed that intelligence is a number of unique processes or abilities that is separate from one another. At the turn of the 20th century, a French Psychologist named Alfred Binet opposed Galton's position. Binet (1905) believed that intelligence should not be separated. In his work, the ability to produce results came from memory and concentration working together. Wechsler built on the connectedness of Binet's definition. He felt that intelligence is an aggregate capacity to function with purpose (Cohen & Swerdlik, 2004; Weiten, 2004). In creating his concept of intelligence, Wechsler considered a combination of mental abilities such as processing speed, memory and reasoning that created intelligence (Georgas, Weiss, van de Vijer, Saklofske, 2003).

Within the last few decades, the concept of intelligence has taken on new dimensions of complexity. The first dimension encompassed the various forms of intelligence that an individual possess. Expanding to a new dimension, Sternburg (1985) defined three types of intelligences: creative, practical and analytical. He felt that most intelligence assessments measure primarily measure analytical intelligence. Moving past the three types, Gardner (1993) believed that the human mind posses seven unique intelligences that include interpersonal, intrapersonal, linguistic, spatial, musical, analytical (logical-mathematical) and bodily-kinesthetic. Goleman (1995) would combine the interpersonal and intrapersonal intelligences into emotional intelligence. Yet, in the academic arena, emotional intelligence as a true intelligence is still up for debate. Some contemporary researchers felt that this is simply an overlap of intelligence and personality (Ackerman & Heggestad, 1997; Sternberg, Lautrey, & Lubart, 2003). Questions that Wechsler posed at the turn of the 20th century still remains – are emotions part of intelligence, and how does it work with intelligence. If one is to subscribe to Binet's definition of intelligence, splitting the various dimensions of intelligences is not feasible (Cohen & Swerdlik, 2004; Weiten, 2004).

Another dimension of intelligence rests on cultural definitions. According to Georgas, Weiss, van de Vijer, Saklofske (2003), specific ecological and social requirements define intelligence. For example, even with similar cultures in Taiwan and China, the need for conformity in China creates contrasting definition of intelligence between the two countries with similar cultures (Chen, 2001; Ryan, Dai, & Paolo, 1995). An "intelligent" individual in China would remain silent to show respect. On the contrary, in Baganda of Uganda, an intelligent individual would externalize thought, not to keep quite (Wober, 1974). These different cultural norms create unique concepts of intelligence on a new dimension.

The concept of intelligence will continue to evolve with newer assessment tools and brilliant theorists. Perhaps, an existentialism approach might be ideal for the definition of intelligence (Krell, 1993; Moser & Vander Nat, 1995). The concept of intelligence has its own time and place. As the changing world continues to connect cultures with its global economy, the definitions of intelligence will become even more complex. In one instance, intelligence may be the ability to think rationally and to take action. In another, intelligence is one's ability to simply allow one's emotions to flow without making hash decisions. Regardless of the careful thought on the definition of intelligence, one definition of intelligence is unlikely (Cohen & Swerdlik, 2004).

Assessment of intelligence

Prior to making further conclusions concerning the definition of intelligence, the assessment of intelligence is required to illustrate a theory. According to Boak (2002), the measurement of intelligence predates the establishment of psychology. Galton was one of the first who took on this monumental task. He felt that intelligence was a hereditary trait best measured through their senses. As a follower of Aquinas, a well-known philosopher in the 13th century, Galton believed that one's sense was the key to knowledge and intelligence (Cohen & Swerdlik, 2004; Kaufman & Lichtenberger, 1999; Moser & Vander Nat, 1995). During Galton's time, laboratory equipment measured isolated senses to determine intelligence (Galton, as cited in Johnson, McClearn, Yuen, Nagoshi, Ahern, & Cole, 1985). These assessment techniques provided limited validity as a gage for the complex nature of intelligence. (Kaufman & Lichtenberger, 1999).

In 1905, Binet-Simon created the first meaningful intelligence test. Although Binet believe in the complex mixture of abilities that defined intelligence, the Binet-Simon Scales presented intelligence as a singular dimension (Georgas, Weiss, van de Vijer, Saklofske, 2003; Kaufman &

Lichtenberger, 1999; Riod & Barram, 2004). In their efforts to be efficient and practical, the new instrument helped the Paris government quantify school children with learning disabilities (Cohen & Swerdlik, 2004). Terman (1916) adapted the Binet-Simon scales for the United States. Although others have translated the French test into English, Terman had the awareness to consider cultural aspects of the measurement in addition to translation. Using Stern's (1914) theory of intelligence, Terman created a new scoring scheme called intelligence Quotient (IQ), which was one's mental age divided by one's chronological age multiplied by 100 (Wober, 1974). Furthermore, he was the first to obtain a standardization sample of American children and adolescents. These actions enabled Terman's revisions to be the most popular IQ test in the United States for the next four decades (Kaufman & Lichtenberger, 1999). Due to his affiliation with Stanford University, Stanford-Binet Intelligence Scales became the name of the new assessment (Roid & Barram, 2004).

By the time World War I arrived in 1917, newer versions of the Stanford-Binet included assessment of adults (Anastasi & Urbina, 1997; Cohen & Swerdlik, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003). As a student of Terman, Otis created a group-administered IQ test (Alpha) that helped screen recruits. By this time, the apparent need to create a nonverbal test was clear as immigrants who spoke little English filled America (Kaufman & Lichtenberger, 1999). Thanks to Terman and Otis' work, today's Stanford-Binet Intelligence Scale (SB5) includes five subtests for both verbal and nonverbal methods.

Wechsler's instrument arrived in 1939. Named the Wechsler-Bellevue Intelligence Scale, this assessment was a collaboration of many subtests developed by others. It provided a comprehensive measure of intelligence applications that included the military, hospitals and schools (Georgas, Weiss, van de Vijer, Saklofske, 2003). The assessment mirrored Wechsler's

belief that "…intelligence is not the mere sum of these abilities" (1939, p. 3). With its many revisions, Wechsler's battery of tests remains the dominant tool for psychology professionals (Camara, Nathan, & Puente, 2000; Georgas, Weiss, van de Vijer, Saklofske, 2003; Kaufman, 1990; Kaufman & Lichtenberger, 1999; Prifitera, Weiss & Saklofske, 1998; Weiten, 2004).

Challenges of IQ Assessments

Current applications for these intelligence assessments range from children to adults and from public to private organizations (Chapman, Hesketh, Kistler, 2002; Georgas, Weiss, van de Vijer, Saklofske, 2003). Along with vast applications of these two assessments, a common challenge is the cultural differentiation of intelligence assessment (Georgas, Weiss, van de Vijer, Saklofske, 2003; Irvine, 1988). One of the fundamental challenges in psychology today is the question of whether a universal psychological process exists across cultures. Based on Terman's belief, one cannot simply translate an intelligence scale into a different language. Consideration of cultural norms is critical to intelligence assessment (Georgas, Weiss, van de Vijer, Saklofske, 2003).

Culture

Before going further, the definition of culture must be clarified. A commonly accepted definition is by Kroeber and Kluckhohn (1952):

> Culture consists of patterns, explicitly and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts: the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values cultural systems

> may on the one hand be considered as products of action, on the other as conditioning elements of further action (p.181).

As a global concept, culture may refer to all types of human activity such as symbols, economic activity, traditions, institutions and especially the way one thinks. In essence, one's culture could include everything (Georgas, Weiss, van de Vijer, Saklofske, 2003).

From an intelligence assessment perspective, studies have repeated found differences in either the IQ scores or the subtest score profiles of specific cultures. For example, African American, Hispanics and Native Americans tend to have lower scores than that of Caucasians and Asians (Cohen & Swerdlik, 2004). This evidence suggests that one's culture have an impact on the determination of intelligence. Sometimes, even within a single country such as Switzerland, three distinct cultural groups (German, French, and Italian) exist to complicate the measurement of intelligence (Georgas, Weiss, van de Vijer, Saklofske, 2003).

The purpose of studying culture with respect to intelligence is to create an understanding for the relationships between cultural contexts and human behaviors as a manifestation of cognitive processes (Berry, Poortinga, Segall, & Dasen, 2002; Georgas, Weiss, van de Vijer, Saklofske, 2003). While there are thousands of cultural groups across the world, understanding that relationship is an enormous task (Georgas, Weiss, van de Vijer, Saklofske, 2003).

Defining intelligence from a cultural perspective

The effort to define intelligence within various cultures began by the end of the 19th century (Georgas, Weiss, van de Vijer, Saklofske, 2003). Within each culture, intelligence may have a fresh perspective not shared by others. For example, Irvine (1988) found unique aspects of intelligence in the Shona of Zimbabwe. According to his study, intelligence exhibits behaviors such as knowing one's limits and respecting elders, while unintelligence exhibits behaviors such

as having an invented ambition and poking fun at elders. Other parts of the world such as Songhay of Mali and Samia of Kenya value social and communal traits as a part of intelligence (Putnam & Kilbride, 1980). In Kipsgis of Kenya, intelligent behavior include a verbal quickness that assumes a high level of comprehension of complex matters (Super, 1983). In contrast, the same verbal quickness is disrespectful and unintelligent in Taiwan when addressing someone who is older (Chen, 2001; Georgas, Weiss, van de Vijer, Saklofske, 2003).

The challenge to define intelligence based on cultural context is increasing. As the world continues to mix through a global economy, cultural boundaries are being crossed and mixed (Ahlawat & Ahlawat, 2006). Even within the United States, the melting-pot of the world contains many immigrants from multiple generations who consider intelligence uniquely. The differing social facets and behaviors that define intelligence will continue to be a challenge for theorists to define (Georgas, Weiss, van de Vijer, Saklofske, 2003). These differing perspectives on intelligence challenge users of assessments to carefully consider the interpretation of scores. With a vast number of studies on many cultures, consideration of cultural differences is part of the ethical responsibility of assessment users (Cohen & Swerdlik, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003; Weiten, 2004).

Stanford-Binet Intelligence Scale

The latest version of the Stanford-Binet Intelligence Scales (SB5) is version five. This version is the work of a seven year revision with many enhancements. Constructed on a five-factor hierarchical cognitive model based on Carroll's (1993) research, SB5 consist of five cognitive factors: fluid reasoning, knowledge (crystallized ability), quantitative ability, visual-spatial processing and working memory in both verbal and nonverbal domains (Roid & Barram, 2004).

History of development

SB5 has roots stemming from the first useful intelligence test – the Binet-Simon scale. In the early 1900's, Binet was a member of a government educational committee. He took on the task of creating a reliable diagnostic tool for identifying children with mental challenges. In 1905, the first revision of the Binet-Simon scale consisted of 30 pass-fail items. The test required both mental and physical approaches to solve each task. Revisions of the original came at 1908 and again at 1911 to include adults. Binet also balanced the scale with five items at each age level in the 1911 version (Riod & Barram, 2004).

A sudden death met Binet in 1911. Goddard (1908) and Terman (1911) continued Binet's work and adopted the scale for the United States. Within five years, Terman (1916) extended the scale while collected standardization norms of more than 2,300 children and adolescents. Even though the initial revision was published as the Stanford revision and extension of the Binet-Simon Scale, later revisions took the name of Stanford-Binet. Along with retaining Binet's complex mixture of abilities as intelligence, Terman also added Stern's (1914) intelligence quotient. By 1936, the Stanford-Binet scale emerged as one of the most popular intellectual ability tests in America (Riod & Barram, 2004).

Further revisions added new concepts and theories. The third edition took on deviation IQ instead of ratio IQ. The standardization (nearly 4,500 subjects) provided a normative mean of 100 and a standard deviation of 16. The fourth edition took on a new appearance and structure with a four-factor hierarchical model (Thorndike, Hagen, & Sattler, 1986). They included verbal reasoning, abstract/visual reasoning, quantitative reasoning and shot-term memory (Riod & Barram, 2004).

Standardization & norms

The SB5 has one of the largest normative samples in intelligent assessments. With a sample of 4,800, the subject age ranged from 2 through 96, which close mirrored the stratification percentages of the 2000 United States Census. Socioeconomic levels took into consideration one's completed years of education and/or the subject's parents' education level. The ethnicity stratification had six groups: African American, Asian American, Anglo/Caucasian American, Native American, Hispanics and other. Also considered were gender and geographic region. A valuable addition to the normative sample was the 1,365 subjects of special interest groups. These individuals included those with learning disabilities, mental retardation, attention deficit and speech or hearing impairments. This data provides valuable detail for comparison when assessing individuals with these challenges (Roid & Barram, 2004).

Reliability & Validity

The reliability of the SB5 is well established. For internal consistency, both the overall IQ score and the five Factor Index scores illustrated excellent reliability. The reliability for the IQ scores ranges from 0.95 to 0.98, while the five Factor Index scores range from 0.90 to 0.92. Furthermore, all 10 subtests provided split-half reliabilities that ranged from 0.84 to 0.89 (Roid & Barram, 2004).

The evidence of validity included numerous comparisons with other intelligence assessment instruments such as the WISC-III, WAIS-III, Stanford-Binet Intelligence Scale, Forth Edition and the Woodcock-Johnson III Test of Cognitive Abilities. Table 1 illustrates the correlations for the full scale IQ with other tests (Roid & Barram, 2004).

Table 1

Correlations of FSIQ for SB5 with other intelligence assessments.

Test	Correlation
Stanford-Binet Intelligence Scale, Forth Edition (SB4)	.90
Wechsler Intelligence Scale for Children, Third Edition (WISC-III)	.84
Wechsler Adult Intelligence Scale, Third Edition (WAIS-III)	.82
Woodcock-Johnson III Test of Cognitive Abilities, five factors (WJ III)	.90

Applications perspective: Contributions to mental assessments

SB5 has a wide range of applications for both children and adults. Especially with the addition of special interest groups in the normative sample, SB5 satisfies a unique niche considering the government regulations on learning disabilities (Roid & Barram, 2004).

Children

Studies with children often use the SB5 (Roid & Barram, 2004). Taylor, Dearing, & McCartney (2004) used SB5 to study the intelligence development of children based on the parent's economic resources. Another area of interest is learning disabilities. Based on two driving forces, SB5 is specially suited to predict, determine and assist in the diagnosis of learning disabilities. These driving forces are The President's commission on Excellent in Special Education (2002) and the Disabilities Education Act (IDEA, 1997). Both call for special attention and intervention with learning disabled children. For example, Roid (2003a) and Roid

& Pomplun (2004) used SB5 to show the predictive ability of Working Memory and Quantitative Reasoning on a student's reading and mathematical achievements. In another study, Woodcock, McGrew, & Mather (2001) recommended the use of SB5 with achievement tests such as the Woodcock-Johnson III Test of Cognitive Abilities (WJ III).

Another major application with children is attention-deficit/hyperactivity disorders (ADHD). According to Szatmari (1992), approximately 9% of all boys and 3% of all girls exhibit signs of ADHD in North American schools. A later study found 3-6% of all school-age population may experience ADHD (Robison, Sclar, Skaer, & Galin, 1999). In addition to the additional standardization of special interest groups such as ADHD, Roid (2003b) was able to show specific patterns of subtest scores that indicate ADHD. These patterns can assist clinicians on determining ADHD and its respective intervention.

Adults

While adults with learning disabilities and ADHD use SB5, other applications vary greatly including aging, illness, legal proceedings, injury, etc. Clinical applications may include working with adults to determine Workers Compensation and disability determination after a work-related injury (Roid & Barram, 2004). In one study of traumatic brain injury, SB5 is able to show weakness in the areas of nonverbal fluid reasoning, working memory and quantitative reasoning, along with verbal visual-spatial processing and working memory (Roid & Barram, 2004).

Another significant contribution to society is the courtroom application of SB5. Often, when a defendant seeks to deny responsibility of actions through reasons of insanity or diminished capacity, psychologist use SB5 to determine the validity of their case. For example, individuals with low levels of IQ scores may indicate diminished capacity under certain situations (Roid &

Barram, 2004). This application help provide appropriate intervention for individuals responsible for illegal actions.

Cultural differences

Cultural considerations in intelligence assessments continue to be a topic of interest (Cohen & Swerdlik, 2004; Georgas, Weiss, van de Vijer, Saklofske, 2003; Weiten, 2004). SB5, along with others, face extensive reviews by experts. As one of the first to face extensive fairness reviews, experts from religious perspective include Buddhism, Hinduism, Islam, Judaism and Christianity. From the ethnic perspective, African American, Native American or Alaskan Native populations, Asian American or Pacific islander and Hispanic experts have extensively reviewed SB5 (Roid & Barram, 2004). Other studies on gender and ethnic groups use the Mantel-Haenszel statistical procedure (Holland & Tayer, 1988; Mantel & Haenszel, 1959) to illustrate the fairness of SB5. These extensive reviews provide evidence concerning the fairness of the SB5 as an intelligence assessment instrument.

Strength and Weakness

As with any instrument, SB5 has many strengths and weaknesses. According to Roid & Barram (2004), one of the major strengths of SB5 is that it equally covers 5 verbal cognitive factors and 5 nonverbal cognitive factors. The combination of the point-scale format from SB4 with the functionality of Terman & Merrill's (1960) level design allows the test to be specifically tailored to the individual. This provides a much needed improvement for children who are disabled and gifted. Another unique strength is the computer-scoring program. Although criticized as an extra cost, the computer assistance makes scoring much more efficient and friendly.

The weaknesses of SB5 include the confusion of IQ scores. The conventional scale of IQ range is from 10 to 160. The SB5 IQ range is from 40 to 225. The levels of the SB5 who are not familiar with the Form L-M format compound the confusion. Familiarization of the tool and a simple conversion table of IQ scores addressed these issues of confusion. Another critique of SB5 is the limited amount of studies on classroom applications (Roid & Barram, 2004). Since this is a relatively newer instrument, these studies will be abundant in time.

Wechsler Intelligence Scales

Wechsler Intelligence Scales is the most popular intelligence assessment tools in existence (Camara, Nathan, & Puente, 2000; Georgas, Weiss, van de Vijer, Saklofske, 2003; Kaufman, 1990; Kaufman & Lichtenberger, 1999; Prifitera, Weiss & Saklofske, 1998; Weiten, 2004). Although not as old as the Stanford-Binet Scales, David Wechsler created the Wechsler Intelligence Scales in 1939. Numerous applications from children to adults and from the United States to Japan prove popularity (Georgas, Weiss, van de Vijer, Saklofske, 2003; Kaufman & Lichtenberger, 1999).

History of Development

Influences on Wechsler

David Wechsler, the father of the Wechsler Intelligence Scales, learned a great deal from the Stanford-Binet scales while he was in the army assessing recruits. A crucial lesson was the common misdiagnosis that failed to consider nonverbal abilities. The heavy reliance on verbal abilities created an unfair assessment, especially for immigrants who have not mastered the English language. Applying his learning form Spearman and Pearson from his years in London, Wechsler was a follower in the two-factor theory of intelligence. Based on his experiences in the

Army and his education in London and Columbia University, Wechsler defined intelligence as "the capacity to act purposefully, top think rationally and to deal effectively with his [or her] environment" (Wechsler, 1944, p. 3). Using this definition, he went on to create an instrument that took into consideration the "aggregate of specific abilities that are qualitatively different" (Georgas, Weiss, van de Vijer, Saklofske, 2003, p. 11).

The Wechsler Intelligence Scales instrument

One of the criticisms of Wechsler's time was that he did not create the Wechsler Intelligence Scales from explicit theory. Yet, the combination of his strong statistical education and clinical skills created an instrument that lead to its popularity today. The equal weight of verbal scales and performance scales was innovative. As the chief psychologist at Bellevue Hospital in New York City, Wechsler created form II of the Wechsler-Bellevue in 1946 (see figure 1 for the historical lineage of Wechsler Intelligence Scales). The primary innovation is the use of deviation IQs, which was psychometrically superior to the ratio IQ that Terman was using at that time (Kaufman & Lichtenberger, 1999).

The WAIS-III and the WISC-III are great-grandchildren of the original Wechsler-Bellevue Scales. These versions included a multi-score subtest profile in addition to three IQs, instead of a single IQ. Such advances met an emerging need in the field of learning disabilities as required by two major government policies in education. During the 1960s, these innovations dethroned Stanford-Binet as the king of intelligence assessment. Since then, the various Wechsler Intelligence Scales have remained the king of IQ assessments (Kaufman, 1990; Kaufman & Lichtenberger, 1999). In a survey of 402 clinical psychologists, 97% of these psychologists used either the WAIS or WAIS-R. Furthermore, within educational institutions, Wechsler instruments were dominant in curriculums (Oakland & Zimmerman, 1986).

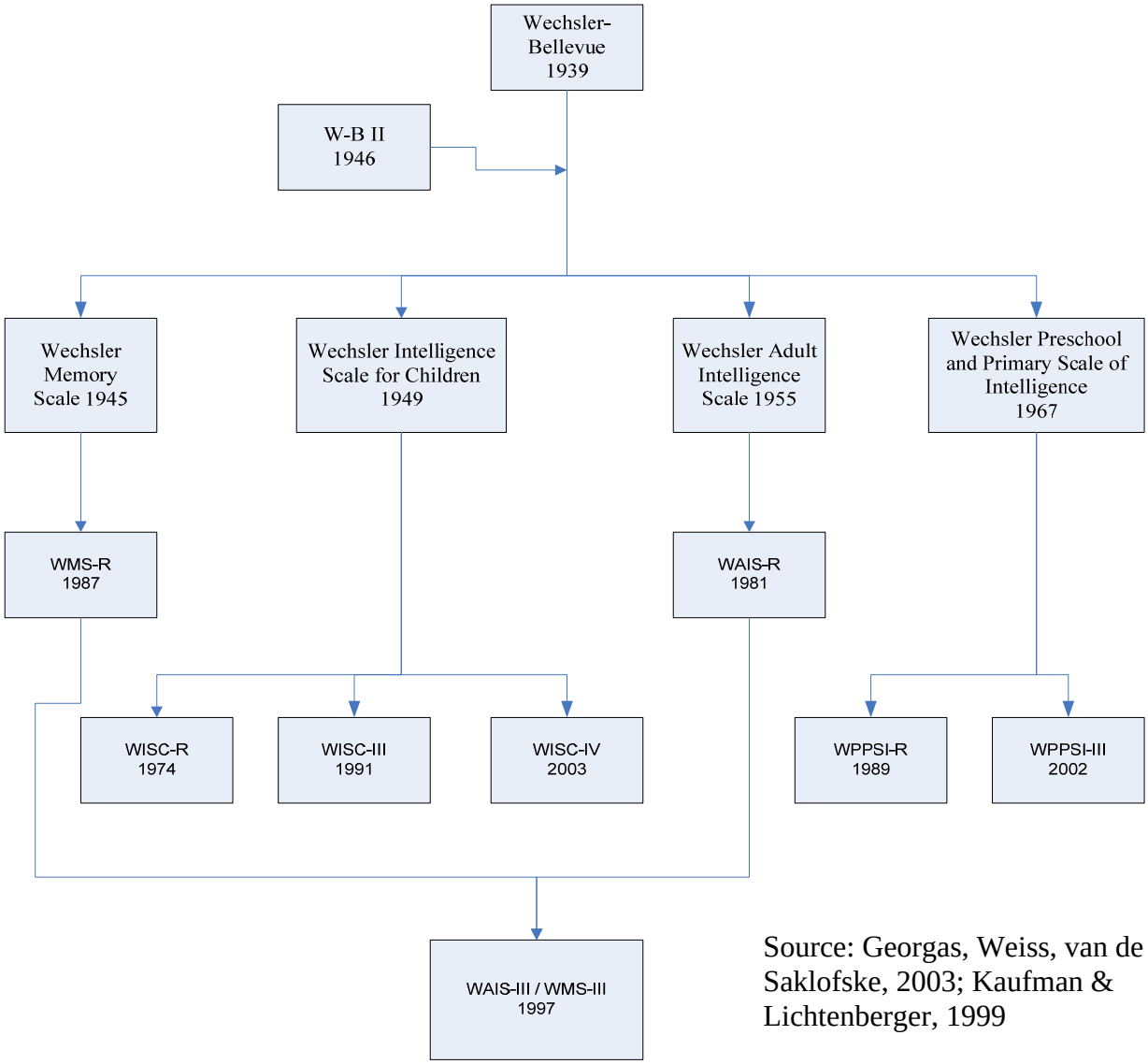

Figure 1. History of Wechsler Intelligence Scales.

Standardization & norms

The Wechsler Intelligence Scales has two versions; for adults, there is the WAIS-III is; for children, there is the WISC-III. They both have a 4-factor index. The verbal abilities consist of Verbal Comprehension and Working Memory. The performance abilities consist of Perceptual Organization and Processing Speed (Kaufman & Lichtenberger, 1999).

The standardization of WAIS-III contains 2,450 subjects that mirrored the 1995 United States Census. Similar to the SB5, age, gender, ethnicity and educational level determined stratification. The 13 age groups comprised 100 to 200 subjects each. This standardization provided norms for ages ranging 16 to 89 (Kaufman & Lichtenberger, 1999).

The standardization for the WISC-III had a normative sample of 2,200 children from the ages of 6 to 16. This sample closely approximated the 1988 United Stated Census by age, parent education and ethnic group (Georgas, Weiss, van de Vijer, Saklofske, 2003).

Reliability & Validity

Three-level reliability analyses illustrated WAIS-III's reliability. With the first level, the split-half reliability across the 13 age groups ranged from 0.94 to 0.98. On the second level, the factor indexes ranged from 0.88 for Processing Speed to 0.96 to Verbal Comprehension. Finally, the third level reviewed the individual subtest reliabilities, which ranged from 0.70 to 0.93 with a median of 0.88. Using a 5 week period in between tests, test-retest reliability of the Full Scale IQ ranged from 0.95 to 0.97. The Verbal IQ test-retest reliability ranged from 0.94 to 0.97, while the Performance IQ reliabilities were a lower at 0.88 to 0.92 (Kaufman & Lichtenberger, 1999).

The reliability for WISC-III also used a three-level reliability analyses. At the first level, average reliabilities of the overall IQs were all above 0.90. The second level was the index scores. The lowest reliability score was the Processing Speed Index at 0.85, while the highest reliability index was Verbal Comprehension Index at 0.94. The third level was the subtests. Object Assembly had the lowest reliability at 0.69; Vocabulary and Block Design had the highest reliability at 0.87 (Georgas, Weiss, van de Vijer, Saklofske, 2003).

According to Kaufman & Lichtenberger (1999), the data from validity studies of the WAIS-III is significantly superior to older versions. Compared to Stanford-Binet IV, the correlation of Full Scale IQ is 0.88. Compared to the Standard Progressive Matrices, correlation between Full Scale IQs is 0.64. Factory analyses provided the only questionable validity. While all other age groups showed evidence of construct validity, the oldest age group (75-89) raised some concern for Perceptual Organization subtests (Kaufman & Lichtenberger, 1999).

The validity of WISC-III is illustrated by the intercorrelation of subtest scaled scores. Median correlations range from 0.93 for Processing Speed Index to 0.99 for verbal comprehension index (Georgas, Weiss, van de Vijer, Saklofske, 2003). Additional studies has further supported the validity of the WISC-III (e.g. Sattler & Saklofske, 2001; Kush, Watkins, Ward, Ward, Canivez, & Worrell, 2001).

Applications perspective: Contributions to mental assessments

The Wechsler Intelligence Scales has a vast application based including schools, hospitals, private companies and the military (Georgas, Weiss, van de Vijer, Saklofske, 2003). The four indexes (Working Memory, Processing Speed, Verbal Comprehension, Perceptual Organization) provide a solid based for diagnosis with both children and adults (Georgas, Weiss, van de Vijer, Saklofske, 2003; Kaufman, 1994).

Children

The application of WISC-III with children span include clinical, counseling, occupational, psychoeducational and neuropsychological. The learning profiles published in 1991 enable WISC-III to be a widely accepted assessment for learning disabilities (LD) (Kaufman & Lichtenberger, 1999). The unique ACID subtests provide an indication of LDs in children.

Like the SB5, ADHD is also a common application for WISC-III. According to Kaufman (1994) and Georgas, Weiss, van de Vijer, Saklofske (2003), certain indexes and subtests illustrate ADHD. From the index perspective, lower Working Memory and Processing Speed are clear indicators of ADHD. From the subtest perspective, the SCAD profiles indicate both ADHD and LD in children.

Adults

Adult applications range from occupational determinations to age trends. Some studies show that Performance IQ has a peek at the age of 24 and declines with age. On the other hand, Verbal IQ peeks at age 50 and remains relatively stable with a minor decline as one ages (Kaufman & Lichtenberger, 1999). Other applications looked at the ability of people to learn from previous attempts. The gain score analysis using the WAIS-III illustrated interesting learning abilities of people in different age groups (see table 2). According to Kaufman & Lichtenberger (1999), the ability to learn from previous experiences decreases with age. The youngest age group (16-29) had the highest gain score, while the oldest had the lowest (Kaufman & Lichtenberger, 1999).

Table 2

Gain score comparison with age ((Kaufman & Lichtenberger, 1999).

Age group	Gain Score on Full Scale IQ
16-29	6 points
30-54	5 Points
55-74	4 Points
75-89	3 Points

Cultural differences

The cultural studies concerning the Wechsler Intelligence Scales are extensive, especially when compared to SB5. Although considerable efforts were given to minimize bias during instrument design, studies have been conducted involving many cultural groups including the Unites States, United Kingdom, Scotland; France, Lithuania and Taiwan (Crawford, Gray, & Allan, 1995; Crawford & Allan, 1996; Georgas, Weiss, van de Vijer, Saklofske, 2003; Wechsler, 1997b; Wycherley, Lavender, Holttum, Crawford & Mockler, 2005).

Application of WISC-III on Children

With the United States, African American children tend to score 15 points lower than whites. Furthermore, the Hispanic children's differences are lower; neither study took into consideration the socioeconomic status of these children. Another interesting finding was that a child with one parent tend to score 6 points lower than a child with two parents (Georgas, Weiss, van de Vijer, Saklofske, 2003).

Other cultural analyses illustrated various differences in intelligence. Only within the United Kingdom, a sample of 824 matching the population demographics found the IQ patterns that closely resemble those of the United States. When looking at other countries such as France, Lithuania, Taiwan and China, evidence of profile differences was significant. For example, French children had a significantly lower Freedom from distractibility loading (0.30 for French and 0.73 for US). Lithuania children score 6.8 points lower in Full Scale IQ, while the greatest difference was 9 points in the Verbal index (Georgas, Weiss, van de Vijer, Saklofske, 2003). All of these studies across various countries provided evidence of cultural impact on intelligence assessment.

Application of WAIS-III on Adults

Evidence of cultural impact to intelligence assessments also appeared in adult studies. Scottish, United Kingdom and Canadian samples all illustrated differences in IQs (Crawford, Gray, & Allan, 1995; Crawford & Allan, 1996; Georgas, Weiss, van de Vijer, Saklofske, 2003; Longman, 2005; Wycherley, Lavender, Holttum, Crawford & Mockler, 2005). A Scottish sample revealed IQ means slightly higher than those of the United States, while the variance was significantly less due to the considerably lower diversity of the population (Crawford, Gray, & Allan, 1995; Crawford & Allan, 1996). The United Kingdom sample also showed slightly elevated IQ means (Georgas, Weiss, van de Vijer, Saklofske, 2003). This brings forth an interesting difference – the children in the United Kingdom did not show much difference when compared to the United States norms, yet the adults did.

Canadian samples also produced different results on the WAIS-III (Longman, 2005). Although the subject of these studies is on cultures similar to those of the United States, cultural difference still influenced IQ assessment. Such evidence call for careful comparisons with meaningful and relevant norms when interpreting results of the Wechsler Intelligence Scales.

Strength and Weakness

According to Kaufman & Lichtenberger (1999), the Wechsler Intelligence Scales have many strengths and limited weaknesses. The four factor structure of the instrument provides high reliability and stability of IQs. The addition of three new subtests (Matrix reasoning, Symbol Search, Letter-Number Sequencing) is also considered to be a strength enabling neuropsychological interpretations. Other strengths include the extension of the upper age range from 74 to 89. The over-sampling of African Americans and Hispanic individuals enabled item bias analyses (Kaufman & Lichtenberger, 1999).

Some of the weaknesses included minor issues like the busyness of picture completion. Some felt that the busyness is distracting while others felt that the details of picture completion slightly bias disadvantaged children in a negative manner. The Matrix Reasoning subtests colors were also found as distractions and unfair to color-blind individual. From the statistical perspective, there is a need to address the similar results found between the 18-19 and 20-24 age groups (Kaufman & Lichtenberger, 1999).

Future implications of these instruments

As the world continues to mix in culture, one of the prime areas of further study is the relationship between culture and intelligence (Berry, Poortinga, Segall, & Dasen, 2002; Georgas, Weiss, van de Vijer, Saklofske, 2003). Careful interpretations of these instruments (SB5, WAIS-III and WISC-III) is a must for all examiners. From an ethical perspective, proper licensing of professionals is a must, in order to fairly conduct and interpret the meaning of intelligence assessments with consideration to culture, educational and environmental factors (Georgas, Weiss, van de Vijer, Saklofske, 2003). As computers enhance efficiency of measurements, one might call for a slowing down of interpretations and take the time to carefully consider contributing factors like one's culture.

Conclusion

Defining intelligence is a goal of intelligence assessments such as the SB5, WISC-III and the WAIS-III. While each has its own strength in working with children and adults, specific attention is required to ensure the proper administration, interpretation and application of these instruments. The cultural impacts to intelligence are clear (Georgas, Weiss, van de Vijer,

Saklofske, 2003). Therefore, when applying intelligence assessments, one must carefully and diligently consider all factors.

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