Bilingual Hispanic Children's Performance on the English and Spanish Versions of the Cognitive Assessment System

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This study compared the performance of referred bilingual Hispanic children on the Planning, Attention, Simultaneous, Successive (PASS) theory as measured by English and Spanish versions of the Cognitive Assessment System (CAS; Naglieri & Das, 1997a). The results suggest that students scored similarly on both English and Spanish versions of the CAS. Within each version of the CAS, the bilingual children earned their lowest scores in Successive processing regardless of the language used during test administration. Small mean differences were noted between the means of the English and Spanish versions for the Simultaneous and Successive processing scales; however, mean Full Scale scores were similar. Specific subtests within the Simultaneous and Successive scales were found to contribute to the differences between the English and Spanish versions of the CAS. Comparisons of the children's profiles of cognitive weakness on both versions of the CAS showed that these children performed consistently despite the language difference.

Keywords: bilingual assessment, intelligence, PASS Theory, Cognitive Assessment System, non-biased assessment

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Hispanics are currently the largest minority group in the United States, consisting of some 37 million people, or about 13% of the population (Ramirez & de la Cruz, 2002). The majority of Hispanics speak Spanish (28.1 million people in the United States), making it the largest of the four major language groups. Hispanics ages 25 and older are less likely to have a high school diploma than are non-Hispanic Whites (57.0% and 88.7%, respectively), and 27.0% of Hispanics have less than a ninth-grade education compared with only 4.0% of non-Hispanic Whites (Ramirez & de la Cruz, 2002). The large number of Hispanic children with limited English language skills and academic attainment present important challenges to psychologists who evaluate them with traditional IQ tests.

Traditional intelligence tests based on the concept of general ability and measured using verbal, nonverbal, and quantitative tasks have an established place in psychology and education. The inclusion of verbal and quantitative items, however, has been criticized by some because these questions rely too much on English language skills and are often like those questions included in achievement tests (Naglieri & Bornstein, 2003; Naglieri & Ford, 2005; Suzuki & Valencia, 1997). Although the problems associated with tests of general ability that include verbal and quantitative skills have been known for some time (e.g., Pintner, 1923), there has been a recent resurgence in the development of intelligence tests that avoid this content (Bracken & McCallum, 1998; Naglieri, 1997). Some researchers have suggested that not only should verbal and quantitative tests not be included in a measure of ability, but that intelligence should be defined as basic psychological processes (e.g., Fagan, 2000; Gardner, 1983; Naglieri, 2002; Sternberg, 1988). Some have argued that a processing approach to defining and measuring intelligence could allow ability to be assessed without the verbal and quantitative items typically included in traditional IQ tests (Suzuki & Valencia, 1997). A processing approach could also be more appropriate across racial groups (Fagan, 2000) and, according to Ceci (2000), could allow for early detection of disabilities related to academic failure, have better diagnostic utility, and provide a way to better understand children's disabilities. There is increasing evidence that one such processing approach, the Planning, Attention, Simultaneous, Successive (PASS; Naglieri & Das, 2005) theory, may be a viable alternative to traditional IQ tests, particularly for culturally and linguistically diverse populations (Naglieri, 2002, 2003).

Suzuki and Valencia (1997) described the PASS theory and the Cognitive Assessment System (CAS; Naglieri & Das, 1997a) used to measure the theory as "an innovative approach to traditional intelligence assessment that assesses a broader spectrum of abilities than has been previously available in IQ testing" (p. 1111). The PASS theory (Naglieri & Das, 1997b) was conceptualized following the work of A. R. Luria (1980/1966, 1973); therefore, verbal and quantitative tests were not considered appropriate for inclusion (Naglieri & Das, 2005). Instead, four PASS constructs formed the basis of the theory and were used to define basic psychological processes (Naglieri & Das, 1997b) as follows:

1. Planning is a mental activity that provides cognitive control, use of processes, knowledge and skills, intentionality, and self-regulation. This includes self-monitoring and impulse control as well as generation, evaluation, and execution of a plan. This process provides the means to solve problems and may involve control of attention, simultaneous, and successive processes, as well as acquisition of knowledge and skills.
2. Attention is a mental activity that provides focused, selective cognitive activity and resistance to distraction. Attention is involved when a person must demonstrate focused, selective, sustained, and effortful activity.
3. Simultaneous processing is a mental activity by which a person integrates stimuli into interrelated groups or a whole. Simultaneous processing tests typically have strong spatial aspects but can involve both nonverbal and verbal content as long as the cognitive demand of the task requires the integration of information.
4. Successive processing is a mental activity by which the person works with stimuli in a specific serial order. Successive processing involves both the perception of stimuli in sequence and the formation of sounds and movements in order. For this reason, successive processing is involved with activities such as phonological skills (Das, Naglieri, & Kirby, 1994) and the syntax of language.

Fagan (2000), as well as Suzuki and Valencia (1997), suggested that using a test of basic psychological processes would allow for more efficient and accurate evaluation of children from diverse populations. Suzuki and Valencia noted the potential of PASS and CAS for this use and called for research involving minority populations "given concerns confronting practitioners in assessing a growing diversity in clientele" (p. 1111).

There have been three research reports on the utility of the PASS theory with diverse populations. Naglieri, Rojahn, and Matto (2005) studied matched samples of Black (N = 298) and White (N = 1,691) children on the CAS. Regression analyses, controlling for key demographic variables, showed an estimated CAS Full Scale mean score difference of 4.8. Correlations between the PASS scores and achievement were similar for Blacks (*Mdn* = .70) and Whites (*Mdn* = .64). Rojahn, Naglieri, and Aquilino (2005) studied samples of Hispanic (N = 115) and White (N = 115) children matched on key demographic variables and found a 4.8

difference between CAS Full Scale standard scores. Finally, Van Luit, Kroesbergen, and Naglieri (2005) found that children in regular education in the Netherlands earned scores on the CAS administered in Dutch that were not significantly different from the normative values obtained for the U.S. standardization sample. These studies suggest that the PASS constructs yield smaller differences between racial and ethnic groups than do traditional measures of general ability and that the exclusion of verbal and quantitative tests did not lead to a reduction in the extent to which the scores related to achievement (Naglieri, 2003).

Although there is an emerging body of literature supporting the validity of the PASS theory as measured by the CAS for assessment of minority students (Naglieri, 2000, 2003), to date no studies involving bilingual children have been reported. Therefore, this study examined bilingual children's performance on the English and Spanish versions of the CAS to test Fagan's (2000) suggestion that measuring intelligence as processing could provide a viable way to assess ethnic groups. More specifically, we compared the scores bilingual children earned on the English and Spanish versions of the CAS. We also examined the profiles of PASS scores the children earned on each version of the test. Finally, we looked at the consistency of cognitive processing weaknesses found using the two versions of the CAS.

METHOD

Participants

The sample consisted of 55 children and adolescents ages 5 to 17 years (36 boys and 19 girls) who were referred for reading and other academic learning problems. The children and adolescents included in this study all attended a midwestern public school district of approximately 40,000 students in one of Chicago's northwest suburbs. The overall school district population is 52% Caucasian, 33% Hispanic, 7% African American, 7% Asian, and less than 1% Native American. The district serves communities on a 90-square-mile boundary extending into three counties. The Hispanic children in this study came from homes with low parental education levels. Only about 15% of the parents of the children in this sample attended college (see Table 1). Table 1 also provides the participants' proficiency levels in Spanish and English, based on the Woodcock Munoz Language Survey (Woodcock & Munoz-Sandoval, 2001). Most of the children earned a Spanish proficiency score of 2 (40%) or 3 (56.4%), which means that as a whole, the group had "limited" or "very limited" Spanish language proficiency. Similarly, most of children earned a score of 2 (21.8%) or 3

Table 1. Demographic Characteristics of the Sample of Hispanic Children (N = 55)

Demographic characteristic		Percentage
Age in years		
5–7		20.0
8–10		50.9
11–13		16.3
14–16		7.2
17		5.5
	Male	Female
Gender	65.5	34.5
	Spanish	English
Fluency rating		
1—Negligible	1.8	20.0
2—Very limited	40.0	54.5
3—Limited	56.4	21.8
4—Fluent	1.8	3.6
5—Advanced	0.0	0.0
Total	100.0	99.9
	Mothers	Fathers
Parents' education level		
<12 years	39.6	37.4
High school graduate	52.8	37.3
>12 years	7.6	23.5
Total	100.0	98.2

Note. Percentages do not sum to 100.0 due to rounding or missing data.

(54.5%) on the English portion of the fluency test. Only 1.9% and 3.6% of the sample was fluent in Spanish or English, respectively.

Procedures and Data Analysis

Each participant was administered both the Spanish and English versions of the CAS by a school psychologist fluent in both Spanish and English. Administration order of the CAS was nearly equally counterbalanced, with 45.5% of the participants receiving the Spanish version first and 54.5% of the participants receiving the English version first. The two versions of the CAS were administered as part of a multifactored assessment in response to a referral because of academic difficulties. Participants were also administered the Spanish and English versions of the Woodcock Munoz Language Survey (Woodcock & Munoz-Sandoval, 2001).

All CAS test protocols were scored using the CAS Rapid Score computer-scoring program (Naglieri, 2003), and standard scores were used in all analyses. Pearson correlations were calculated and corrected for restriction in range where appropriate, using the formula provided by

Guilford and Fruchter (1978). When scores obtained from both versions of the CAS were restricted, the Guilford and Fruchter formula was applied sequentially to correct for restriction in the two distributions. Both obtained and corrected correlations are reported.

Repeated measures analysis of variance (ANOVA) was used to examine differences across the CAS Spanish and English versions for the four PASS scales and also for the specific subtests within the scales. Differences between the mean scores earned using the English and Spanish versions of the CAS were also compared by computing *d* ratios, using Cohen's (1988) formula: $(X_1 - X_2)/\mathrm{SQRT}\ [(n_1 * SD_1^2 + n_2 * SD_2^2)/(n_1 + n_2)]$. The *d* ratio is an expression of the difference between the means in standard deviation units based on the average standard deviations. The values proposed by Cohen (1988) for small, medium, and large effects are, respectively, .20, .50, and .80. The differences between the standard scores obtained by each child for each individual subtest and the four separate PASS scales were calculated. The scores obtained by the sample on the English version of the CAS were subtracted from those earned using the Spanish version of the CAS. Cumulative frequency distributions of these differences were obtained to better examine the range of disparity between the two versions of the CAS.

Finally, the consistency between the profile of PASS scores on the Spanish and English versions of CAS was examined for each child. First, each child's PASS scores were compared with that child's average PASS score, using the method described by Naglieri (1999) to determine the significance of the intraindividual differences. This approach is typically described as ipsative comparison methodology, originally proposed by Davis (1959) and Silverstein (1982, 1993). We first identified children who had a significant ipsative or relative weakness. Of that group of children, we then examined whether they had a corresponding standard score that was less than 90. The selection of children on the basis of (a) significant intraindividual variation in PASS scores and (b) a PASS standard score of less than 90 meets Naglieri's (1999, 2000) definition of a cognitive weakness. Finally, we calculated the percentage of children who had a cognitive weakness on both the English and the Spanish versions of the CAS and the percentages of children who had a weakness on the same PASS scale when given in English or Spanish.

Cognitive Assessment System

The CAS (Naglieri & Das, 1997a) is an individually administered test for children ages 5–17 years designed to evaluate cognitive processes. The CAS is derived from the PASS theory and consists of four scales: Planning, Attention, Simultaneous, and Successive. Each scale has a mean of 100 and a standard deviation of 15. All but 2 children were administered the 12-subtest Standard Battery. The test was standardized on a sample of 2,200 children who were selected to reflect the demographics of the United States in terms of race, gender, parental education, geographic location, community setting, and educational placement. The average Standard Battery Full Scale reliability coefficients are as follows: Full Scale, .88; Planning, .88; Attention, .84; Simultaneous, .93; and Successive, .93. The four PASS scales are described below.

Planning Scale

The Planning subtests require children to determine how to solve each item, develop a plan of action, apply the plan, modify the plan as needed, and control their impulses, acting with careful consideration. In addition, planning subtests require the use of strategies for efficient performance (Naglieri & Das, 1997b). *Matching Numbers* requires children to underline two of the same numbers out of six that appear in a row. Children who use strategies such as scanning the row and examining the numbers carefully in sequence to find a match earn higher scores on this test than those who do not use a strategy (Naglieri & Das, 1997b). The *Planned Codes* subtest requires the child to complete a page of codes (e.g., XX, OX) that correspond to letters (e.g., A, B) that are provided in a legend at the top of the page. The child is required to fill in the appropriate codes that go in the empty boxes beneath each letter. Children are allowed to complete each page in the order they choose to allow for application of strategies such as filling in all the As, then Bs, and so on (Naglieri & Das, 1997b). The *Planned Connections* subtest requires children to connect numbers in a serial order, and the last two items require children to connect numbers and letters in an alternating sequential order (e.g., 1-A-2-B-3-C).

Attention Scale

The Attention subtests require children to selectively focus their cognitive activity to detect particular stimuli, inhibiting responses to competing stimuli. The *Expressive Attention* task includes an interference condition after administration of items without interference. Children ages 5 to 7 years are administered pictures of common animals depicted as big or small. Children are required to determine whether the animal is big or small in real life when its relative size on the page conflicts with its actual size. Children ages 8 years and older are administered color words (i.e., *blue, yellow, green,* and *red*) that are printed in a color different than that of the color name. The child is required to name the color the word is printed in, rather than read the word. *Number Detection* consists of pages of numbers printed in different type fonts. For each page, children are required to underline a particular stimulus (e.g., the numbers 1, 2, and 3 in an open font) among distracter items (e.g., the same numbers printed in a different font). In the *Receptive Attention* subtest, children are presented with two conditions, with both age groups (5–7 and 8–17) receiving the conditions of first physical comparisons, in which they have to identify items that are the same in appearance, and then lexical comparisons, in which they have to identify items with the same name.

Simultaneous Scale

The Simultaneous processing subtests require children to integrate separate stimuli into an interrelated group. Simultaneous processing involves spatial and logical dimensions for verbal and nonverbal content. *Nonverbal Matrices* consists of geometric designs and shapes that are interrelated through spatial or logical organization. Children are required to decipher the relationships among parts of the shape or geometric design and choose the best of six options that fits a missing space in the grid. *Verbal-Spatial Relations* requires children to match the verbal description of an item to objects and shapes arranged in a specific spatial configuration. *Figure Memory* requires children to examine a two- or three-dimensional figure for 5 s, then the figure is removed and the child must reproduce that original figure on a larger, more complex geometric design that is presented.

Successive Scale

Successive processing involves the integration of material into a specific sequential order in which each element is related to those that precede it. The Successive processing subtests involve the perceiving stimuli in a strictly defined serial order. *Word Series* requires children to repeat a series of high-frequency words in the correct order. *Sentence Repetition* requires children to repeat a sentence using color words in the correct order. *Speech Rate* (ages 5–7) requires children to repeat a three-word series until the examiner tells them to stop, then to repeat single- and double-syllable word series in order 10 times. *Sentence Questions* (ages 8–17) consists of the same questions as in sentence repetition, but children are asked to answer a question about the sentence.

Full Scale

The CAS Full Scale score is an overall measure of cognitive processes that is the equally weighted composite of the Planning, Attention, Simultaneous, and Successive subtests (Naglieri & Das, 1997a).

Translation and Adaptation of the CAS

The translation and adaptation of the CAS into Spanish was developed by a team headed by Wanda C. Rodríguez at the University Center for Psychological Services and Research at the University of Puerto Rico, Río Piedras, Puerto Rico. The CAS translation followed the conceptual and methodological considerations discussed by Bravo (2003) and Canino and Bravo (1999) regarding cultural adaptation of psychological instruments aimed at assessing the characteristics of ethnic minorities. This included translation using the back-translation method. A bilingual team made the translation of the CAS from English into Spanish. Another bilingual team translated that Spanish version back into English. This version was then compared with the original CAS. The same method was used to translate the Administration and Scoring Manual, the test's written materials, and the scoring sheet.

The 12 CAS subtests were divided into two equal groups, and each group was assigned to a pair of translators. Each translator of the team worked independently on six subtests, and once the subtests were translated, the two translators on the same team compared their translations. They discussed the disagreements, and when necessary consulted a translator on the other team. When they reached an agreement in the translation of their six subtests, one translator from each team joined to determine the consistency of the vocabulary used in the whole test. Finally, the coherence analysis between the English and the Spanish version was made by an additional group with considerable experience in tests translation and adaptation.

Woodcock Munoz Language Survey

The Woodcock-Munoz Language Survey—English and Spanish (Woodcock & Munoz-Sandoval, 2001) are sets of individually administered tests designed to measure a broad sampling of proficiency in four critical areas of oral language, listening, reading, and writing. The instruments provide an overall measure of language competence as well as cognitive–academic language proficiency in both English and Spanish. The English version was standardized on approximately 6,300 participants in the United States and the Spanish version on approximately 2,000 participants in Argentina, Costa Rica, Mexico, Peru, Puerto Rico, Spain, and the United States. The tests rate language proficiency on the following 5-point scale.

> *Level 1: Negligible.* When compared with others of the same age or grade, the individual demonstrates negligible cognitive–academic language proficiency. If provided with monolingual instruction, it is expected that a student with a score of 1 will find the language demands of the learning task impossible to manage.
>
> *Level 2: Very Limited.* When compared with others of the same age or grade, a Level 2 individual demonstrates very limited cognitive–academic language proficiency. If provided with monolingual instruction, it is expected that a Level 2 student will find the language demands of the learning task extremely difficult.
>
> *Level 3: Limited.* When compared with others of the same age or grade, a Level 3 individual demonstrates limited cognitive–academic language proficiency. If provided with monolingual instruction, it is expected that a Level 3 student will find the language demands of the learning task difficult.
>
> *Level 4: Fluent.* When compared with others of the same age or grade, a Level 4 individual demonstrates fluent cognitive–academic language proficiency. If provided with monolingual instruction, it is expected that a Level 4 student will find the language demands of the learning task manageable.
>
> *Level 5: Advanced.* When compared with others of the same age or grade, a Level 5 individual demonstrates advanced cognitive–academic language proficiency. If provided with monolingual instruction, it is expected that a Level 5 student will find the language demands of the learning task very easy.

RESULTS

Examination of the means for this sample of bilingual Hispanic children indicates that the group earned Full Scale scores that fell in the Low

Average classification on both the Spanish (M = 87.6) and English (M = 84.6) versions of the CAS. The separate PASS scale means ranged from 78.0 (Successive mean from the English version of the CAS) to 95.1 (Attention mean from the Spanish version of the CAS). Within each version, the bilingual children earned their lowest scores on the Successive scale. These findings indicate that the children were experiencing considerable deficits in most of the four basic psychological processes, particularly in Successive processing regardless of in which language the test was administered.

PASS standard score means and standard deviations (provided in Table 2) using the Spanish and English versions of the CAS were, in general, similar. These bilingual Hispanic children earned identical mean scores on the Planning scale (92.65) given in English and Spanish and very similar scores on the Attention scale (Ms = 94.84 and 95.11, for English and Spanish, respectively). Larger differences were found between the means obtained using the English and Spanish versions of the CAS for the Simultaneous (Ms = 89.05 and 93.05, respectively) and Successive scales (Ms = 78.04 and 83.15, respectively). Despite these differences, the Full Scale means were similar (Ms = 84.64 and 87.64 for the English and

Table 2. Means, Standard Deviations, *d* Ratios, and Obtained and Correction Correlations Between the English and Spanish Versions of the Cognitive Assessment System (CAS; N = 55)

CAS Subtests and Scales	CAS English		CAS Spanish			Correlations	
	M	*SD*	*M*	*SD*	*d*	Obtained	Corrected
Subtests							
Matching Numbers	8.64	2.70	8.65	2.88	−.01	.90	.92
Planned Codes	9.16	2.33	9.11	2.35	.02	.98	.99
Planned Connections	8.70	2.66	8.70	2.45	.00	.93	.96
Nonverbal Matrices	8.93	2.93	9.00	2.86	−.02	.97	.98
Verbal Spatial Relations	6.71	3.01	8.44	3.02	−.57	.62	.62
Figure Memory	9.34	1.86	9.36	1.73	−.01	.91	.99
Expressive Attention	8.87	2.63	9.15	2.66	−.11	.95	.97
Number Detection	9.11	2.38	9.00	2.35	.05	.96	.98
Receptive Attention	9.43	2.49	9.34	2.61	.04	.96	.98
Word Series	6.15	2.85	6.91	2.66	−.28	.85	.89
Sentence Repetition	6.22	2.54	7.22	2.56	−.39	.65	.76
Speech Rate/Sentence Questions	6.98	2.37	7.66	2.20	−.30	.80	.92
Scales							
Planning	92.65	13.19	92.65	13.48	.00	.96	.97
Simultaneous	89.05	12.81	93.05	13.76	−.30	.90	.93
Attention	94.84	13.96	95.11	13.94	−.02	.98	.98
Successive	78.04	13.17	83.15	12.69	−.40	.82	.89
Full Scale	84.64	13.66	87.64	13.85	−.22	.96	.97

Spanish versions, respectively). All these differences were no greater than .4, which is considered small using Cohen's (1988) description ($<.5$ is small; .5–.7 is medium, and .8 and higher is large).

Repeated measures ANOVAs showed statistically significant differences across the CAS Spanish and English versions for the Simultaneous and Successive scales, $F(7, 47) = 10.472$, $p < .0001$. The Spanish version means were higher for each scale, with a 4-point difference for the Simultaneous scale and a 5-point difference for the Successive scale. Results showed no ordering effect for Spanish and English test administration, $F(1, 53) = 1.304$, $p = .259$, indicating that administering the Spanish or English version first did not influence test scores. Repeated measures ANOVAs were conducted to identify the specific subtests within the Simultaneous and Successive scales that contributed to the differences between the English and Spanish versions. These analyses showed that one subtest, Verbal Spatial Relations, multivariate $F(5, 47) = 10.696$, $p < .0001$, accounted for the overall difference in Simultaneous English–Spanish version mean scores, showing a higher Spanish mean. All three subtests were significantly different across Spanish and English versions on the Successive scale, with Sentence Repetition showing the largest difference, followed by Word Series and then Speech Rate/Sentence Questions, all showing higher mean scores on the Spanish test version, multivariate $F(5, 47) = 6.490$, $p < .0001$.

Table 2 shows subtest *d* ratios that range from .00 to .57. Closer examination of the values presented in Table 2 suggests that variable performance at the subtest level had influence on the respective CAS scales. The largest *d* ratios were found for Verbal Spatial Relations (.57), Sentence Repetition (.39), Speech Rate/Sentence Questions (.30), and Word Series (.28). These four subtests had the most effect on the size of the Simultaneous and Successive scale comparisons. The remaining subtest *d* ratios ranged from .00 to .11.

Table 2 also presents both the obtained Pearson and corrected correlations for the Spanish version of the CAS with the English version of the CAS for each subtest and PASS scale. These correlations were corrected for restriction in range as evidenced by standard deviations that were less than the normative value of 15 (PASS scales) and 3 (CAS subtests). Restriction in range has the effect of reducing the magnitude of the obtained Pearson correlation coefficient, and therefore obtained correlations as well as corrected correlations (Guilford & Fruchter, 1978) are reported. The obtained and corrected correlations, respectively, for the PASS scales are as follows: Planning, .96 and .97; Simultaneous, .90 and .93; Attention, .98 and .98; Successive, .82 and .89; and Full Scale, .96 and .97. The obtained CAS subtest correlations ranged from .62 to .98, and the corrected correlations ranged from .62 to .99. These results suggest that there was a strong relationship between the standard scores obtained from the Spanish version and the English version of the CAS.

Table 3 provides the percentages of students who earned differences between the English and Spanish versions of the CAS of varying magnitudes. The values presented in Table 3 indicate that, for example, 49.1% of the sample earned a CAS Full Scale score on the Spanish version that was 1 standard score point higher than the score these children earned on the English version. The vast majority of the sample (75.4%) earned Full Scale scores on both versions of the CAS that differed by 5 points or less. (Note, Naglieri & Das [1997b] reported that the average standard error of measurement of the CAS Full Scale across all ages is 3.1.) Results indicate that for the majority of the CAS subtests, the difference between children's scores on the Spanish version of the CAS and the English version was less than one confidence interval (6.1). Similar results were found for the PASS

Table 3. Frequency Distribution of the Percentages of Students With Differences Between Subtest Scales and PASS and Full Scale Standard Scores of Varying Magnitudes Obtained Using the English and Spanish Versions of the Cognitive Assessment Survey (CAS)

CAS Subtests and Scales	English scores higher than Spanish						Spanish scores higher than English							
Subtest differences	−5	−4	−3	−2	−1	0	1	2	3	4	5	6	7	8
Matching Numbers		1.8	1.8	5.5	5.5	70.9	3.6	9.1			1.8			
Planned Codes					12.7	81.8	3.6	1.8						
Planned Connections		1.8		3.6	14.5	54.5	21.8	3.6						
Nonverbal Matrices					10.9	76.4	9.1	1.8	1.8					
Verbal Spatial Relations		3.6	3.6	3.6	7.3	14.5	9.1	21.8	10.9	10.9	7.3	5.5		1.8
Figure Memory				3.6	10.9	70.9	9.1	5.5						
Expressive Attention					10.9	60.0	23.6	3.6		1.8				
Number Detection					27.3	58.2	12.7	1.8						
Receptive Attention				3.6	18.2	65.5	9.1	3.6						
Word Series			1.8	3.6	5.5	43.6	16.4	14.5	9.1	5.5				
Sentence Repetition	1.8	1.8	1.8	3.6	9.1	25.5	10.9	27.3	9.1	3.6	1.8	3.6		
Speech Rate/Sentence Questions					7.3	10.9	30.9	23.6	16.4	9.1	1.8			
Scale differences	−25	−20	−15	−10	−5	0	5	10	15	20	25	30	35	40
Planning				5.4	27.2	38.2	20.0	9.0						
Simultaneous				7.2	10.9	16.4	21.8	30.9	7.3	5.4				
Attention				1.8	29.0	30.9	34.5	3.6						
Successive			3.6	5.4	14.6	1.8	16.3	32.6	16.4	7.3	1.8			
Full Scale				5.5	12.7	3.6	49.1	27.3	1.8					

Note. Differences were calculated by subtracting the standard scores obtained using the English from the Spanish CAS versions. Negative scores indicate that the child earned a higher score on the English than Spanish versions.

scales. Differences among PASS scales indicate that a large percentage of Planning, Simultaneous, Attention, Successive, and Full Scale scores differ by ±5 points.

Like the *d* ratios, the most noteworthy frequency differences were for the Verbal Spatial Relations and Sentence Repetition subtests. Both of these subtests involve the use of language skills and showed important differences between the CAS given in English and the CAS given in Spanish. It is important to consider that these children were limited in English and Spanish language skills. These results indicate that with this group of bilingual children, the more the subtest involved language, the lower the score. The subtest score differences were, of course, reflected in the PASS scales. The Simultaneous and Successive PASS scales evidenced the larger distribution of CAS Spanish standard scores that were higher than English standard scores.

Comparisons of the children's PASS cognitive weakness profiles on both the Spanish and English versions of the CAS demonstrated that despite the influence of language skills, these children perform consistently. There was an average overall agreement between all PASS scales of about 90%. On the Planning scale, 92.7% of the children who had a cognitive weakness on the English version of the CAS had a cognitive weakness on the Spanish version. The Simultaneous (89.1%) and Attention (100%) scales were also generally consistent between the English and Spanish versions of the CAS for cognitive weakness. The Successive (78.2%) scale showed considerable similarity, but it was the lowest of the scales. Most of the time, children who had a cognitive weakness on the Spanish version of the CAS also had a cognitive weakness on the English version.

DISCUSSION

The purpose of this study was to meet the need expressed by Fagan (2000) and Suzuki and Valencia (1997) for research on basic psychological processes for children from diverse populations. The current findings, like past research that has found small PASS score differences between Blacks and Whites (Naglieri, Rojahn, Matto, & Aquilino, 2005) as well as between Hispanics and Whites (Rojahn et al., 2005), suggest that the CAS may have utility for assessment of bilingual students because of the consistency between the results when administered in English or Spanish. The children in this study earned similar Full Scale scores, deficits in Successive processing were found on both versions of the test, and more important, 90% of children who had a cognitive weakness on one version of the CAS also had the same cognitive weakness on the other version of the CAS. These results suggest that PASS scores could be used as part of a comprehensive evaluation to identify a disorder in one or more of the basic psychological processes as described by current Individuals With Disabilities Education Act legislation for a specific learning disability (see Hale, Naglieri, Kaufman, & Kavale, 2004) and that the results would be the same regardless of in which language the CAS was administered.

Differences between the performance of these children on the two versions of the CAS were minimal for the Full Scale, but some noteworthy variations were found for the separate PASS scales. Although these bilingual Hispanic children earned identical mean scores on the Planning and Attention scales, the Simultaneous and Successive score differences found reflected important subtest variation. The lower Verbal Spatial Relations subtest scores obtained when administered in English suggest that these children's language limitations adversely influenced their performance. Practitioners can reduce the influence of this subtest (a) by administering the scale in Spanish; (b) when giving the test in English, by replacing Verbal Spatial Relations with Figure Memory and using the eight subtest CAS Basic Battery; or (c) by excluding Verbal Spatial Relations and prorating the Simultaneous score as described by Naglieri (1999). The effect of language skills on the Successive scale was more pervasive. Even though the Sentence Repetition subtest had the largest difference between English and Spanish CAS versions, all three Successive scale subtests were lower when given in English. Administration in Spanish is, therefore, recommended for bilingual children who have poor English language skills. More important, regardless of the language used, these children's lower scores on the Successive scale are consistent with past research summarized by Das et al. (1994) and Naglieri (1999, 2003) for children with reading problems.

This study has limitations that should be considered. First, there was restriction in the variation of English and Spanish proficiency levels. This did not allow for the examination of the differences between English and Spanish versions at various levels of language proficiency in each language and the corresponding pattern of CAS standard scores. This is particularly important given the increasing number of Hispanic and bilingual children in the U.S. population (Bracken & Naglieri, 2003). A second possible limitation is that the sample, although adequate, was restricted to one school district in the Midwest. Future research should be conducted with children from different regions of the country who have different Spanish language backgrounds and varying levels of proficiency in both Spanish and English. These limitations suggest that additional research is needed to replicate this study, using more diverse populations of Hispanic children with and without learning problems from a variety of locations. Careful examination of the level of skills in each language and the corresponding effects on the processing scores should also be examined.

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