Excerpted from *Pediatric Test of Brain Injury (PTBI)* by Gillian Hotz, Nancy Helm-Estabrooks,
Nickola Wolf Nelson, and Elena Plante

6

Evidence-Based Practice (Technical Analyses)

Examiners need to know that the interpretations they make are supported by data-based evidence. In this chapter, we review the types of questions examiners should ask about the nature of any test, which will inform their conclusions about test performance. Therefore, this section covers validity and reliability information as well as information concerning analysis of test bias.

We continue to use the concept of constrained and unconstrained skills (cf. Paris, 2005) to interpret results. To review, *constrained* subtests tap skills that develop relatively early in development (e.g., knowing one's name, naming common items). *Unconstrained* subtests tap skills that tend to show continued refinement over a wide range of ages. The PTBI contains both types of subtests, and the statistical results are presented separately for each type. A question and answer framework is used to describe the evidence base related to various clinical questions about the nature of the PTBI.

EVIDENCE FOR CONSTRUCT-IDENTIFICATION VALIDITY

Question 1: How do I interpret the criterion categories?

The categories of performance for each age are based on the performance of the group of children without brain injuries selected to represent the general population. The percentages of these children whose scores fell into each of the four criterion categories is provided in Table 6.1. As this table shows, most scores fell into the High performance category. The differences in the percentages of children classified into the different performance categories reflects naturally occurring differences in the range of performance that children in the general population show in these different skill areas.

Technical Notes

Scores from 103 children (57 girls, 46 boys) were classified against the criterion categories for this source of evidence. They ranged in age from 6 to 16 years, with an average age

Table 6.1. Classification of scores of children without brain injuries into performance criterion categories

	Performance criterion categories			
Subscale	Very Low	Low	Moderate	High
1. Orientation	0%	6%	19%	75%
2. Following Commands	7%	8%	2%	83%
3. Word Fluency	3%	20%	25%	53%
4. What Goes Together	2%	1%	19%	78%
5. Digit Span	2%	6%	30%	62%
6. Naming	0%	4%	3%	93%
7. Story Retelling—Immediate	2%	10%	28%	60%
8. Yes/No/Maybe	0%	5%	18%	77%
9. Picture Recall	0%	5%	35%	60%
10. Story Retelling—Delayed	0%	3%	20%	77%

of 9 years, 11 months. No child had been diagnosed with a brain injury (TBI or ABI). Note that children were not screened for other conditions that occur in the general population that could affect performance (e.g., learning disability). Therefore, this group is intended to reflect the non–brain-injured general population. Sixty-nine of the children were white, twenty-three were African American, four were Hispanic, two were reported as "other," and one was Asian. Race was not reported for four children. Of the children, 86 were right-handed, 9 were left-handed, and handedness was not reported for 8 children.

Question 2: How do I know the PTBI is testing skills that are relevant to the types of deficits shown by children with neurological disorders?

As Table 6.2 shows, the typically developing children received higher ability scores on all subtests compared with the ABI group. Children with TBI scored significantly lower than their peers without brain injuries on all seven subtests that assess unconstrained skills and two of the constrained skills subtests. The ability scores on the constrained skills subtests were close to ceiling for all three groups; therefore, these subtests are most useful clinically for children with severe impairments. It is also the case that the children with ABI differed from their peers with TBI on four of the subtests, indicating that the pattern of deficits is not necessarily the same for both groups. These data support *construct-identification validity* (Anastasi & Urbina, 1997).

Technical Notes

Ninety-nine children's scores were compared for this source of evidence. Thirty-three children were included in each of the three groups (TBI, ABI, typical). These children were matched by age (mean age of 10 years, 7 months; range 6–16 years) and gender (14 males, 19 females per group). A variety of racial/ethnic groups were included (TBI: 26 white, 7 minority; ABI: 17 white, 16 minority; Typical: 22 white, 11 minority). The majority of the children in each group were right-handed (TBI: 27 right-handed; ABI: 27 right-handed, typical: 25 right-handed). Ability scores were tested using *t* tests with statistical significance at $p < .05$.

Table 6.2. Raw score means (standard deviations) for matched groups of children with Traumatic Brain Injury (TBI; $n = 33$), other acquired brain injury (ABI; $n = 33$), and typically developing children (Typical, $n = 33$).

	Constrained skills			Unconstrained skills						
Category	1. Orientation	2. Following Commands	6. Naming	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling —Immediate	8. Yes/No/ Maybe	9. Picture Recall	10. Story Retelling —Delayed
TBI	30.8[a, b]	14.7	12.18[a,b]	20.37[a,b]	49.51[b]	28.50[b]	45.63[b]	20.57[b]	29.39[a,b]	25.97[b]
	(8.25)	(1.14)	(0.79)	(9.11)	(23.59)	(21.7)	(33.65)	(7.26)	(12.66)	(16.28)
ABI	24.94[a,c]	13.65[c]	11.27[a,c]	14.97[a,c]	52.62[c]	22.08[c]	39.67[c]	18.28[c]	18.70[a,c]	26.09[c]
	(6.75)	(2.45)	(2.35)	(9.60)	(25.32)	(20.71)	(36.01)	(8.13)	(14.39)	(22.98)
Typical	36.02[b,c]	14.90[c]	12.40[b,c]	27.27[b,c]	69.02[b,c]	40.75[b,c]	61.33[b,c]	24.03[b,c]	34.42[b,c]	43.90[b,c]
	(5.29)	(0.54)	(0.38)	(7.74)	(19.83)	(20.40)	(34.53)	(7.37)	(8.31)	(19.91)
Total possible	38.0	15.0	12.5	No limit	100.5	82.5	(1) 51.5 (2) 142.5 (3) 138.5	39.0	45.5	(1) 51.5 (2) 83.0 (3) 111.0

[a]Significant difference between typical and TBI and ABI groups ($p < .05$).
[b]Significant difference between TBI and Typical groups ($p < .05$).
[c]Significant difference between ABI and Typical groups ($p < .05$).
Note: There are three possible point values (one for each story) on Subtests 7 and 10 .

Table 6.3. Correlations between the PTBI subtests and two indices of severity of injury

Scale	Unconstrained skills						
	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling—Immediate	8. Yes/No/Maybe	9. Picture Recall	10. Story Retelling—Delayed
Glasgow Coma Scale	.30	.58[a]	–.05	.34[a]	.46[a]	.49[a]	.43[a]
Rancho Los Amigos Scale	.44[a]	.56[a]	.03	.37[a]	.40[a]	.50[a]	.41[a]

[a]Statistically significant correlations at $p < .05$.

Question 3: Are scores on the PTBI related to the degree of severity of the brain injury for children with TBI?

To address this issue, we correlated the scores on the unconstrained skills subtests of PTBI with scores on the Glasgow Coma Scale (Teasdale & Jennett, 1974) and the Rancho Los Amigos Scale (Hagen, Malkmus, & Durham, 1979). These two scales are frequently used to index severity of brain injury. We did not correlate the constrained skills subtests because the lack of variability in scores even in children with TBI and ABI (see Table 6.2) made this type of statistical analysis inappropriate. As Table 6.3 shows, the scores on most subtests of the PTBI are correlated with severity. However, the degree of correlation is such that the scores of individual PTBI subtests can diverge from these two scales in noteworthy ways for any given individual. This analysis provides a form of criterion-related validity and supports construct-identification validity.

Technical Notes

Thirty-eight individuals (14 females, 24 males) with TBI received both the Glasgow Coma Scale and the Rancho Los Amigos Scale at or near the time of testing. The mean age of these children was 12 years, 9 months (range 7–16 years). Twenty of the children were white, and eighteen were members of minority groups. Thirty-six individuals were right-handed. Pearson product-moment correlations were calculated between each of the subtests of the PTBI and the two scales that index severity. Note that the correlation between the Glasgow Coma Scale and the Rancho Los Amigo Scale was .46.

Question 4: How do I know that the scores I obtain actually reflect a child's ability on the skills tapped by the subtest?

State-of-the-art methods of estimating a child's ability require computation that is often complex and/or time-consuming. Therefore, it was important to have a scoring method that accurately estimated a child's ability but could be computed with relative ease. It also was important to establish that this simple method of calculating a child's ability is close to the ability level that more sophisticated statistical methods would produce.

The ability scores based on the difficulty of the items the child passed or failed were compared with the modeled estimate of child ability using IRT statistical procedures. As Table 6.4 illustrates, there was a very high correlation between the calculated ability score

Table 6.4. Correlations between calculated ability scores and statistically derived ability levels

Constrained skills			Unconstrained skills						
1. Orientation	2. Following Commands	6. Naming	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling —Immediate	8. Yes/No/ Maybe	9. Picture Recall	10. Story Retelling —Delayed
.94	.96	.96	1.00[a]	.75	.93	1) .94 2) .98 3) .90	.97	.94	1) .95 2) .92 3) .85

[a]Because of its open-ended scoring (number of words produced), the Word Fluency subtest was not appropriate for analysis using IRT procedures. For this subtest, raw score = ability score.

Note: There are three possible point values (one for each story) on Subtests 7 and 10.

and the modeled ability of the children tested. This supports concurrent validity for the scores examiners will calculate.

Technical Notes

The standardization sample of 257 children was used for this analysis. Children were between the ages of 6 and 16. Their demographic characteristics are reported in Tables 3.1 and 3.2. Their ability scores were calculated based on the instructions in the test manual. Pearson product-moment correlations were used to correlate calculated ability scores with the ability estimates obtained through IRT methods for each child. IRT methods used a Rasch model to estimate item difficulty and child ability based on subtest performance.

Question 5: When I am looking at performance across subtests, what should I know about how related the different subtests are?

This question addresses another aspect of construct-identification validity. To answer this question, we can consult two sources of data. The first is simple correlations between subtests, and the second is a more sophisticated correlation-based technique known as *factor analysis*. Remember that for the three constrained skills subtests (Subtest 1: Orientation; Subtest 2: Following Commands; Subtest 6: Naming), performance was at ceiling for most children in all three groups (see Table 6.2). Because of this, we excluded these three subtests from these analyses. The lack of variability in the children's scores makes these subtests inappropriate for correlation-based techniques.

Table 6.5 shows the correlations among subtests. As expected, all subtests correlate to some degree because all subtests require the use of language to some degree (even Subtest 9: Picture Recall). There are also some high correlations that one would expect. For example, scores on Subtest 10: Story Retelling—Delayed are strongly correlated with scores on the initial Subtest 7: Story Retelling—Immediate. However, unless you have specific comparisons in mind, it is difficult to make sense of a correlation matrix. For this reason, we used factor analysis to determine the extent to which the scores on various subtests seem

Table 6.5. Correlations among unconstrained skills subtests

	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling—Immediate	8. Yes/No/Maybe	9. Picture Recall	10. Story Retelling—Delayed
3. Word Fluency	1.00	.59	.45	.56	.55	.57	.60
4. What Goes Together	.59	1.00	.36	.56	.54	.56	.54
5. Digit Span	.45	.36	1.00	.29	.30	.37	.25
7. Story Retelling—Immediate	.56	.56	.29	1.00	.63	.49	.79
8. Yes/No/Maybe	.55	.54	.30	.63	1.00	.44	.59
9. Picture Recall	.57	.56	.37	.49	.44	1.00	.48
10. Story Retelling—Delayed	.60	.55	.25	.79	.59	.48	1.00

Note: All correlations are statistically significant.

Table 6.6. Factor loadings for the unconstrained skill subtests of the PTBI

	Factor 1	Factor 2	Factor 3
7. Story Retelling—Immediate	**0.86**	0.27	0.17
10. Story Retelling—Delayed	**0.86**	0.27	0.07
8. Yes/No/Maybe	**0.77**	0.22	0.23
3. Word Fluency	0.47	0.57	0.39
4. What Goes Together	0.45	0.67	0.20
9. Picture Recall	0.23	**0.87**	0.17
5. Digit Span	0.11	0.17	**0.97**

to coalesce, suggesting some common set of skills may be needed for the subtests that belong to a particular factor.

Table 6.6 shows the factor loadings for the seven unconstrained subtests. *Factor loadings* are the degree to which subtest scores correlate with the overarching factor. As this table illustrates, the seven subtests seem to reflect three common factors. The three subtests (Subtests 7, 8, and 10) that require language processing at the sentence/discourse level load on Factor 1. The strongest loading for Factor 2 is for Picture Recall (Subtest 9). What Goes Together (Subtest 4) also loads on this factor. These two subtests require mental organization and integration (semantic and visual). Factor 3 includes only Digit Span (Subtest 5), which requires attention and immediate memory. Word Fluency (Subtest 3) and What Goes Together (Subtest 4) load fairly evenly on all three factors, indicating commonality with skill sets that cross cognitive and linguistic domains.

Technical Notes

Exploratory factor analysis was completed on the ability scores of 257 children between the ages of 6 and 16. Their demographic characteristics are reported in Tables 3.1 and 3.2. We used an initial unrotated principal components analysis and examined the scree plot to determine the likely number of factors. Factors were rotated using a Varimax procedure. We considered both two-factor and three-factor solutions. The three-factor solution provided a more meaningful grouping of subtests and was retained. The difference between the two solutions affected only the Picture Recall subtest, which in the two-factor solution did not clearly load primarily on either of the first two factors.

Question 6: Do scores on subtests designed to assess unconstrained (developmental) skills correlate with age?

We expected subtests that reflected unconstrained skills to show age-related development because, by definition, unconstrained skills develop over a protracted time period. However, the presence of a neurological disorder can disrupt skill acquisition. Therefore, we examined this issue only for typically developing children. As Table 6.2 shows, performance on the constrained skills subtests were near ceiling for most children. This made conducting correlations inappropriate for these subtests because of the highly restricted variability in scores. In contrast, all unconstrained skill subtests showed statistically significant age-related change. This is additional converging evidence for construct-identification validity. Table 6.7 shows age correlations for unconstrained skills.

Table 6.7. Age correlations for unconstrained skills

	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling—Immediate	8. Yes/No/Maybe	9. Picture Recall	10. Story Retelling—Delayed
Total possible score	N/A	100.5	82.5	1) 51.5 2) 142.5 3) 138.5	39.0	45.5	1) 51.5 2) 83.0 3) 111.0
Mean score	28.1	66.3	38.7	57.3	37.6	33.4	42.2
Age correlation	.51[a]	.39[a]	.47[a]	.70[a]	.68[a]	.54[a]	.66[a]

[a]Statistically significant at $p < .05$.

Note: There are three possible point values (one for each story) on Subtests 7 and 10.

Technical notes

Seventy-seven (29 male, 48 female) typically developing children between the ages of 6 and 16 years (mean 9 years, 9 months) were studied. Sixty-two were white, and fifteen were members of various minority groups. Their demographic information can be found in Table 3.2. Sixty-seven of the children were right handed, seven were left-handed, one was ambidexterous, and handedness was not reported for two children. Pearson product-moment correlations were calculated for age and each of the PTBI subtests, and statistical significance was set at $p < .05$.

EVIDENCE FOR RELIABILITY

Reliability data indicate how likely the test is to yield stable information about the child. There are several forms of reliability, and each can be used to address different concerns that a clinician may have when interpreting a test score. These are explained next.

Question 7: How do I know whether change is due to real improvement or just fluctuation that would occur from one test session to the next?

To answer this question, one would have to know that children who are neurologically stable (i.e., typically developing children) receive highly similar scores when tested more than once. This is known as *test–retest reliability*. Test–retest reliability values range from 0 (no correspondence between scores obtained at two different test session) to 1.00 (identical scores obtained by all children at two different test sessions). Note that the test–retest reliability coefficient was the basis for calculating the standard error of measure (SEM). Therefore, the SEM, which is used to track change, accounts for normal test-to-test fluctuation. Table 6.8 shows test–retest reliability for each of the 10 subtests.

Technical Notes

Test–retest reliability was evaluated on 40 children between the ages of 6 and 16 years (mean 10 years). No child had a diagnosis of TBI or ABI. Twenty-three of the children were

African American, twelve were white, three were Hispanic, and two were described as "other." All children were retested after 3–6 weeks (average 32 days, range of 23 to 45 days). Test–retest reliability was determined using a Pearson product-moment correlation calculated on the ability scores for each of the subtests. Correlations were adjusted for restricted range using the method of Gulliksen (1950). All correlations are statistically significant at $p < .05$.

Question 8: How do I know that test scores are not influenced by differences in opinion about how to score the test items?

To answer this question, we would need to have two people independently score tests given to a group of children. This is known as *interrater reliability.* Interrater reliability can be calculated by computing the percent agreement in scoring by two examiners on an item-by-item basis. This is called *point-to-point agreement.* Alternatively, it can be calculated based on the total ability score for each subtest. The latter is based on the correlation between two sets of ability scores obtained from two examiners. In this case, interrater reliability values can vary between 0 (no correspondence between scores obtained by different raters) and 1 (perfect agreement among scores by different raters). Table 6.9 shows interrater reliability for the PTBI subtests.

Technical Notes

Interrater reliability was evaluated on 41 children (19 male, 22 female) who were between the ages of 6 and 17 years (mean 11 years, 8 months). The racial and ethnic characteristics of the children included 15 white children, 17 African American children, 3 Hispanic children, and 6 described as "other." These children included 15 with a diagnosis of TBI, 15 with a diagnosis of ABI, and 11 without brain injury. Tests were originally scored by 14 clinicians. Tests were rescored by a research assistant using the responses recorded verbatim at the time of testing. All raters scored the test items based on the written instructions available on the test protocols. Point-to-point values were calculated based on the percentage of items scored identically by the pair of raters. Correlations were calculated using Pearson product-moment correlation applied to the raw scores for the subtest and total test scores. All correlations are statistically significant at $p < .05$.

EVIDENCE FOR MINIMIZATION OF BIAS

Bias is identified when one group performs differently than another. Therefore, evidence of bias can be assessed empirically. Bias is a concern when interpretation of test performance is influenced by factors irrelevant to the purpose of the test. Next is a discussion of several areas where bias might be a concern and how potential bias was evaluated.

Question 9: What is the evidence that bias has been minimized?

We examined multiple sources of bias to be sure that potential irrelevant influences were either absent or were controlled in ways that would not affect the types of interpretation that examiners would wish to make about test performance.

Table 6.8. Test–retest reliability

	Constrained skills						Unconstrained skills													
	1. Orientation		2. Following Commands		6. Naming		3. Word Fluency		4. What Goes Together		5. Digit Span		7. Story Retelling —Immediate		8. Yes/No/ Maybe		9. Picture Recall		10. Story Retelling —Delayed	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Mean	35.6	36.6	12.0	12.0	12.5	12.5	27.2	29.6	70.4	80.2	33.4	31.7	58.8	56.3	25.2	26.1	31.9	35.6	37.3	39.9
SD	4.4	3.1	3.38	3.45	0	0	7.9	7.5	21.7	19.5	14.0	13.6	38.1	31.8	8.0	7.5	9.5	10.6	17.9	20.2
Adjusted *r*	.88		.99		1.00[a]		.80		.81		.84		1) .83 2) .79 3) .84		.80		.75		1) .80 2) .88 3) .77	

Key: SD, standard deviation.

[a]Projected (all subjects scored at the ceiling of 12.5 at both test sessions).

Note: There are three possible point values (one for each story) on Subtests 7 and 10.

Table 6.9. Interrater reliability

	Constrained skills			Unconstrained skills						
	1. Orientation	2. Following Commands	6. Naming	3. Word Fluency	4. What Goes Together	5. Digit Span	7. Story Retelling —Immediate	8. Yes/No/ Maybe	9. Picture Recall	10 Story Retelling —Delayed
Point-to-point agreement	99%	99%	100%	100%	98%	100%	100%	100%	99%	100%
Correlation	.98	1.00	1.00	1.00	.99	.99	1.00	1.00	.99	1.00

Diagnostic Category

The most critical aspect concerning bias is whether one group of children would be classified differently than another based on aspects of their background (e.g., gender, minority status) other than brain injury. To examine this issue, we considered the rate at which typically developing children were classified into the different criterion categories (i.e., Very Low to High performance). Table 6.10 illustrates that white and minority children's scores fell into similar classification strata, with the greatest number of both white and minority children falling into the High performance category.

Technical Notes

Data from 70 white and 31 minority children were analyzed for Table 6.10. Minority children included 24 African American children, 4 Hispanic children, 1 Asian child, and 2 children described as "other." Children ranged in age from 6 to 16 years (mean 9 years). Scores were classified using the age-appropriate tables in Appendix B.

Analysis of Item Bias in Subtests Tapping Unconstrained Skills

Many test manuals suggest that a diverse composition of the normative group is evidence against test bias. We have included such diversity in our criterion-referenced sample (see Table 3.2); however, bias can occur even when racial, ethnic, and gender diversity is represented in the test sample. Therefore, it is important to explicitly evaluate test items for bias statistically. Item bias can be identified when children of similar abilities nonetheless do not perform on individual items in a similar manner. We evaluated the test items for this possibility using a technique called *differential item functioning (DIF)* at each phase of the development of the PTBI. Candidate items that showed evidence of DIF for males versus females, whites versus racial/ethnic minorities, and monolingual versus bilingual speakers were excluded from the final test.

Table 6.11 reports correlation coefficients for item difficulty levels established for different subgroups of children. The closer the correlation is to 1.00, the less difference there was between groups in terms of how easy or difficult they found the items. The greatest differences occurred for minority or bilingual children on the two subtests that involved story retelling (Subtests 7 and 10). This is not unexpected in that narrative structures are culturally dependent (Westby, 1994). Therefore, we examined performance by broad racial/ethnic subgroups when setting the criterion scores to assure that children in "minority" subgroups were not disadvantaged.

Technical Notes

For the DIF analyses, we used the 257 children described in Tables 3.1 and 3.2. We employed a delta plot approach (Angoff & Ford, 1973) in evaluating DIF between the subgroups of children. DIF can produce chance differences on individual items; therefore, we also looked at the overall performance on the subtest.

The constrained skills subtests (Subtest 1: Orientation; Subtest 2: Following Commands; Subtest 6: Naming) were not analyzed with DIF. This is because children in

Table 6.10. Classification of white and minority children in terms of performance criterion categories

Subscale	White (n = 70)				Minority (n = 31)			
	Very Low	Low	Moderate	High	Very Low	Low	Moderate	High
1. Orientation	1	4	11	54	0	5	6	20
2. Following Commands	3	4	1	62	5	2	1	23
3. Word Fluency	3	12	15	40	0	6	12	13
4. What Goes Together	1	0	12	57	1	2	6	22
5. Digit Span	2	4	17	47	0	5	11	15
6. Naming	0	4	2	64	0	0	1	30
7. Story Retelling—Immediate[a]	2	4	13	49	0	6	11	13
8. Yes/No/Maybe[a]	0	4	14	52	0	2	6	21
9. Picture Recall	0	1	20	49	0	0	14	17
10. Story Retelling—Delayed	0	3	11	56	0	0	9	22

[a]Scores unavailable for some children.

Table 6.11. Item difficulty correlations for subgroups of children on the PTBI

	Boys vs. girls	White vs. minority	Monolingual vs. bilingual
4. What Goes Together	.91	.96	.95
5. Digit Span	.99	1.00	.98
7. Story Retelling—Immediate	.87	.81	.79
8. Yes/No/Maybe	.95	.89	.84
9. Story Retelling—Delayed	.82	.75	.72
10. Picture Recall	.96	.98	.96

all subgroups performed at or near ceiling on these subtests unless they had severe disabilities. This created conditions that were inappropriate for conducting correlational analyses (i.e., restricted ranges, discontinuous distributions). However, because all children were performing at ceiling, it was obvious that there were no meaningful differences by subgroup. An alternate examination of the constrained skills subtests is provided in the next section.

The DIF procedure also was not performed on the Word Fluency subtest. The open-ended nature of scoring for the Word Fluency subtest precluded analysis with DIF procedures.

Analysis of Item Bias in Subtests Tapping Constrained Skills and the Word Fluency Subtest

Table 6.12 shows the subgroup means and standard deviations for those subtests that were inappropriate for DIF analysis. Caution should be applied in interpreting group differences on these subtests because we were unable to equate subgroups for their overall severity, which is a significant advantage for the DIF approach. This being said, the distributions of scores showed a large degree of overlap between subgroups. The largest differences were noted on Word Fluency for minority and bilingual children. This is not surprising because the bilingual children were often also the minority children. In addition, bilingual children may have both a smaller corpus of English vocabulary and more difficulty retrieving English words (e.g., Bedore, Peña, García, & Cortez, 2005; Gollan & Kroll, 2001; Michael & Gollan, 2005; Portocarrero, Burright, & Donovick, 2007). We took this into consideration when setting criterion scores in order to eliminate potential bias from this source.

Table 6.12. Means and standard deviations for constrained skills subtests and Word Fluency subtest for subgroups of children

	Boys	Girls	White	Minority	Monolingual English	Bilingual
1. Orientation	26.43	27.13	26.99	25.92	26.98	24.99
	(5.58)	(4.12)	(4.16)	(6.28)	(5.34)	(7.39)
2. Following Commands	14.51	14.81	14.70	14.61	14.64	13.82
	(1.50)	(0.74)	(1.09)	(1.07)	(1.00)	(2.05)
3. Word Fluency	21.30	22.77	21.88	18.38	21.82	16.46
	(9.60)	(11.42)	(9.68)	(9.35)	(11.55)	(8.64)
6. Naming	11.81	12.23	12.88	11.41	11.70	10.71
	(1.59)	(1.39)	(0.97)	(2.84)	(2.50)	(3.35)

Technical Notes

The gender comparison used 86 children with TBI, 32 children with ABI, and 52 typically developing children. Girls and boys in each group were matched for age. The race/ethnicity comparison included 76 children with TBI, 20 children with ABI, and 24 typically developing children. Half of the children were white and half belonged to other racial or ethnic minority groups. These included 35 African American children, 2 Asian children, 18 Hispanic children, 1 Native American child, and 4 children identified as "other." Children in the white and minority groups were matched for age. The English monolingual versus bilingual comparison involved 36 children with TBI, 16 with ABI, and 4 typically developing children. Twenty-eight of these children were monolingual English speakers, eighteen were speakers of English and Spanish, and ten spoke English and a language other than Spanish. Children in the English monolingual and bilingual groups were matched for age.

CONCLUSION

This chapter guided examiners through the questions to ask to determine test performance. The evidence base for the PTBI was presented. Chapter 7 provides a case study demonstrating a test and retest of the PTBI.

Order Form

BROOKES PUBLISHING • P.O. Box 10624, Baltimore, MD 21285-0624

ABOUT YOU (write in your specialty and check one field that best applies)

Specialty ______

❍ Birth to Five ❍ K–12 ❍ Clinical/Medical Personnel ❍ 4-year College/Grad. ❍ Comm. College/Vocational ❍ Association/Foundation ❍ Comm. Services

Name ______

Address ______

❍ residential ❍ commercial

City ______ State ______

ZIP ______ Country ______

E-mail ______

❍ Yes! I want to receive e-mail about new titles and special offers. (Your e-mail address will not be shared with any other party.)

We auto-confirm all orders by mail; please provide an email address to receive confirmation of order and shipping.

Qty	Stock #	Title	Price

Subtotal	
6% sales tax, MD only	
5% business tax (GST), CAN only	
P.O. customers: 2% of subtotal	
Shipping (see chart below)	
Total (in U.S. dollars)	

PAYMENT METHOD

❍ Check enclosed (payable to Brookes Publishing Co.)

❍ Purchase Order attached (bill my institution)
*Add 2% to product total for P.O. handling fee

❍ American Express (15 digits)

❍ MasterCard (16 digits)

❍ Visa (13 or 16 digits)

Credit card account number __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Security code (3 or 4 digit code on back of card): __ __ __ __

Expiration date __ __ /__ __ Signature ______

Convenient ways to order:

CALL toll-free 1-800-638-3775 M-F, 9 a.m. to 5 p.m. ET.; **FAX** 410-337-8539;
MAIL order form to: Brookes Publishing Co., P.O. Box 10624, Baltimore, MD 21285-0624:
ON-LINE www.brookespublishing.com

Money-back guarantee! Ordering with Brookes is risk-free. If you are not completely satisfied, you may return books and videotapes within 30 days for a full credit of the purchase price (unless otherwise indicated). Refunds will be issued for prepaid orders. Items must be returned in resalable condition. All prices in U.S.A. dollars. Policies and prices subject to change without notice. Prices may be higher outside the U.S.A.

STANDARD GROUND SHIPPING & HANDLING

(For other shipping options and rates, call 1-800-638-3775, in the U.S.A. and Canada, and 410-337-9580, worldwide.)

Continental U.S.A.** territories & protectorates†; AK, HI & PR‡

For subtotal of	Add*
US$55.00 and under	$6.49
US$55.01 and over	12%

***Continental U.S.A. orders ship via UPS Ground Delivery.*
†U.S.A. territories & protectorates orders ship via USPS.
‡AK, HI, and PR please add an additional US$12.00. Orders ship via UPS Air.
Please call or email for expedited shipping options and rates.

Canada

For subtotal of	Add*
US$67.00 and under	$9.99
US$67.01 and over	15%

Orders for Canada are consolidated for shipping twice each month. For minimum shipping time, please place your orders by the 9th or 24th of each month.

**calculate percentage on subtotal*