

**Indirect Language Assessment Tool for English-speaking
Cherokee Indian Children**

Edgarita E. Long and John M. Christensen

The literature indicates a need for culturally appropriate speech and language assessment instruments for American Indian/Alaska Native children. Cherokee Indian and Caucasian children whose ages ranged from 3 to 5 years were compared using a parental questionnaire to assess cognitive, linguistic, and socio-communicative skills. Results revealed that Cherokee scores were significantly lower. Differences were age group related with smaller differences for older children. Linguistic skills were most improved in older children. The developmental profile may be different for Cherokee Indian children than for Caucasian children; therefore, testing Cherokee Indian children at age 3 may be too soon to determine if there is or is not a language delay. These differences may reflect cultural differences in parenting rather than a language delay or disorder.

For over two decades there has been a need to develop appropriate speech-language assessment tools for use with individuals from minority cultures (Evard & Sabers, 1979). Several authors have offered methods to reduce cultural bias to assess individuals from different ethnic-racial groups. Evard & Sabers (1979) recommended three different ways to minimize cultural bias: (a) development of a test for populations

in a specific geographical area, (b) adaptation of an existing test, and (c) development of local norms for an existing test. Taylor & Payne (1983) suggested that:

An individual clinician might use the criterion-referenced approach to assessment by developing his or her own in-house instrument. . . . [by] . . . conduct[ing] a survey of the linguistic behaviors of normal individuals at a number of age levels . . . from the region or cultural groups that represent the clinical population . . . [so that] these behaviors could then be used as the point of reference for assess[ment] . . . (pp. 18-19)

Further, Toronto & Merrill (1983) offered basic procedures for developing and standardizing locally normed tests in order to resolve the problem of valid assessment in culturally diverse populations. They outlined six steps in test construction that could be utilized by speech-language pathologists. Yet standardized tests normed on the mainstream culture continue to be used by speech-language pathologists serving minority populations.

In the latest report of a survey of speech-language pathologists from Washington and Montana, Failing, Stick, & Inglebret (1993) found that practitioners frequently used standardized tests that either did not include the minority culture in the sample (in this case, American Indians/Alaska Natives) or their representation in the sample was uncertain. It is possible that the reason for this continued practice is that the practitioners do not have the time or the expertise during test construction to modify or locally norm standardized tests, especially if the practitioners do not have knowledge of the tribal language or culture of the region.

In the past, speech-language assessment instruments have been normed locally on American Indians residing on reservations (Bayles & Harris, 1982; Goode & Platero,

1985; Uzdawinis, 1983). But this is not widespread practice among speech-language pathologists in states where there are no reservations.

Although Oklahoma Indians do not live on reservations, there are pockets of tribes living in certain areas that once were tribal reserve lands. The largest of these tribes is the Cherokee in northeastern Oklahoma. The headquarters of the Cherokee Nation, located in Tahlequah, Oklahoma, provides one of the largest Head Start programs in the United States where some 800 preschool American Indian children are enrolled. Only American Indian (primarily Cherokee) children are allowed to enroll and all personnel (faculty, administration, and staff) are American Indian. The great majority of the Cherokee Indian children speak only the English language. Over the past 30 years, speech-language pathologists in northeastern Oklahoma have been screening and evaluating the speech and language skills of the Cherokee and other tribes of American Indian children with standardized tests normed on mainstream populations.

Currently, there exists no research that specifically addresses the language developmental status of English-speaking American Indian/Alaska native children. More importantly, there are minimal screening and assessment tools for determining if a potential language disorder exists in this population (Long, 1998).

Indirect screening of a child's development has been used for years in speech-language assessment of Caucasian children and has been shown to be reliable for monitoring developmental status (Sonnander, 1987). Indirect screening involves asking a caretaker about their observations of a child's language skills rather than having the child's behaviors observed directly by a trained diagnostician. Information supplied by

the caretaker along with other screening tools helps to identify children who may need further assessment (Meisels, 1989; Wolery, 1989).

The *Pediatric Developmental Instrument* (research edition) (PDI) consists of development milestones of mainstream populations that are found in the literature as reported by researchers from many different fields of study, such as, psychology, developmental psychology, linguistics, sociolinguistics, speech-language pathology, and others. Aspects of language development included in the PDI consist of (1) linguistic systems, such as, grammatical morphemes, simple sentences, and complex sentences (Brown, 1973; Muma, 1978); (2) speech acts, such as, requests for services, direct & indirect requests, greetings, communicative gestures (Halliday, 1975; Bruner, 1975; Dore, 1975); (3) conversation skills of turn-taking and topic maintenance (Dore, 1986); (4) discourse, such as, naming and describing objects, categorizing words, and reasoning (Blank, Rose & Berlin, 1978); and (5) egocentric speech and communicative intent (Piaget, 1926; Vygotsky, 1962). Also included are cognitive development from Piaget's sensorimotor period and pre-operational stage (Piaget, 1952), and play development, such as, pretend play, parallel play, and cooperative play (Westby, 1980).

Initially, researchers who developed the PDI tested large groups of mainstream children in order to identify patterns that describe important developmental milestones common to most children. Results from these studies allowed the researchers to place the developmental skills into three broad categories (linguistic, cognitive, and socio-communicative) by age, birth to 6 years (Brown and Nye, 1990; and Neeley & Christensen, 1992). In addition, the research studies using the PDI found that parents

could serve as reliable reporters of their children's cognitive, linguistic, and socio-communicative language skills (Brown and Nye, 1990; Neely & Christensen, 1992).

Use of the PDI in cross-cultural studies proved to be valid in determining development of cognitive, linguistic, and pragmatic language skills (Nye & Brown, 1990; Nye, Al-Amyreh, & Marzouka, 1996).

The purpose of this study was to determine if the PDI would be an effective screening tool for speech-language pathologists in assessing the communication skills of nonreservation English-speaking Cherokee Indian children. Since the PDI was standardized on mainstream populations yet has been used in cross-cultural studies to determine developmental milestones, it was chosen for this study for two reasons: (1) to determine if the same characteristics existed in Cherokee Indian children at the same age as Caucasian children, and (2) to determine how these characteristics compared statistically with the mainstream culture. Therefore, this study compared the performance of Cherokee Indian Head Start children and middle class Caucasian children from the Neely & Christensen (1992) study at ages three, four and five with this indirect screening tool. It was hypothesized that there would be no difference in developmental levels of cognitive, linguistic and socio-communicative language skills between the two groups of three, four, and five-year-old Cherokee Indian and Caucasian children.

Method

Participants

Forty-eight Cherokee Indian (CI) children (25 boys and 23 girls) from the Cherokee Nation Head Start program in Tahlequah, Oklahoma, and 37 middle class Caucasian (Ca) children (20 boys and 17 girls) from non-Head Start preschools and daycare centers were assigned to three age groups: 37-48 months (CI n=20; Ca n=12), 49-60 months (CI n=19; Ca n=15), and 61-68 months (CI n=9; Ca n=10). The Cherokee Indian children had a Certificate of Degree of Indian Blood card and were at least 1/8th degree Cherokee Indian. All children passed speech-language and hearing screening assessments. Mothers of the children who passed the screenings were selected as subjects. Of a pool of 112 volunteers, 85 mothers were randomly selected.

Screening instrument respondents were mothers whose ages ranged from 19 to 44 years (mean age = 31). The Cherokee Indian mothers represented the typical, present day Cherokee Indian culture and lifestyle that is influenced by both Caucasian and American Indian cultures. For example, the great majority of the respondents had received at least a high school education and a few had a college degree (mean = 13.5 years). The majority of the mothers worked outside the home either in small community businesses owned and operated by Caucasians or for the Cherokee Nation with mostly American Indian employees. The majority attended or participated in American Indian ceremonies, festivals, and/or politics. Most of them lived on farms in extended family units. Some lived in HUD-built Indian housing additions located in different areas of Tahlequah while others lived in multiple- or single-family dwellings in Caucasian housing additions. All Cherokee Indian participants lived in and around the small rural town of Tahlequah, OK. population approximately 10,500.

Caucasian participants in the Neely & Christensen (1992) study were recruited from daycare centers and preschools in urban, suburban, and rural districts around Tulsa, Oklahoma, population approximately 500,000.

Assessment Instruments

The speech and hearing of all participants were screened before the study began. The *Preschool Language Scale-3 Screening Test* (Zimmerman, Steiner, & Pond, 1992) was used for the Caucasian children in the Neely & Christensen (1992) study. The *Fluharty Preschool Speech and Language Screening Test* (Fluharty, 1978) was selected for the Cherokee Indian participants because normative data exists on this population in the northeastern Oklahoma area. Since different screening tests were chosen, a comparative study seemed warranted.

The *Preschool Language Scale-3 Screening Test* screens only articulation development, while the *Fluharty Preschool Speech and Language Screening Test* screens both language and articulation; therefore, a comparison study of only the two articulation screening tests was conducted to determine if they would have similar results. Twenty Head Start children, 10 Caucasians (5 boys and 5 girls) and 10 Cherokee Indians (5 boys and 5 girls), who were randomly selected from a pool of 80, were administered both articulation screening tests. Two of the children did not meet test standards on the two articulation screening tests while the rest of the participants passed both screening tests. Both children not meeting test standards were Caucasians, one boy and one girl. Results indicated a high correlation ($r = 0.949$, $df=2$,

$p < .0001$) between the results of the two articulation screening tests. Hearing was screened at 20 dB across 1, 2, and 4 KHz.)

The *Pediatric Developmental Instrument* (unpublished, research edition) (Brown & Nye, 1990) is a parent yes-no, developmental screening questionnaire that can be used to identify children birth to six years of age who may warrant further language assessment. It consists of 147 items divided among developmental areas of cognition, linguistics, and socio-communication. See Appendix for representative items for each age group.

Design and Procedure

Survey respondents were mothers of the two groups of children. Trained speech-language pathology students from the University of Tulsa (Neely & Christensen, 1992) and Northeastern State University, Tahlequah, handed out the PDI, answered respondents' questions, and collected completed forms as part of a screening and testing program. Study data were tabulated and analyzed using descriptive and differential statistics.

Results

All items marked "yes" on the PDI were tabulated and represent the raw score for each child. The data for the Cherokee Indian children were compared with Neely & Christensen's (1992) data for middle class Caucasian children (See Table 1 for means and standard deviations). As shown in Table 1, the Cherokee Indian children's scores were consistently lower than those of the Caucasian children. Observed

Insert Table 1 About Here

differences between the youngest group (37 to 48 months) of children became progressively smaller for the older groups of children. The largest differences were for linguistic (9.7) and socio-communication skills (7.7) in the youngest children, and cognitive (5.3 and 3.4) and social skills (4.3 and 2.8) in the older children (49-60 and 6l+ months, respectively).

The most significant improvement of the Cherokee Indian children was in linguistic skills with the greatest gains occurring between ages three (age 37-48 months) and four (age 49-60 months) (See Figure 2). A similar trend was observed in cognition and socio-communication. The greatest improvement in cognition and socio-communication skills occurred between ages 37-48 months and 49-60 months (See Figures 1 and 3). Cognitive development was the least improved.

Insert Figures 1, 2, 3 About Here

Observed performance differences between the Cherokee Indian and Caucasian children were tested using a two-way ANOVA (Groups x Subtests) with repeated measures (Table 2). The lower Cherokee Indian children's scores were significantly different from Caucasian children's scores. Subtest performance differences were explored using post hoc Means Within Cells F-tests since the Groups x Subtest

Insert Table 2 About Here

interactions were significant. Except for the 61+ age group, subtest performance differences for the 37-48 and 49-60 age groups were related to age group membership. Table 1 shows an age group related improvement in PDI scores for the American Indian children. An analysis of this relationship indicated a significant ($df=46$, @ $p.01$) correlation with age for the cognitive ($r=.716$), linguistic ($r=.728$), and socio-communication ($r=.718$) subtests of the PDI.

Discussion

These data suggested significant differences in development skills between the Cherokee Indian and Caucasian groups but that these differences became smaller as age increased. For example, the significantly lower linguistic skills found in 3-year-old Cherokee Indian children were most improved in their 5-year-old Cherokee counterparts. Socio-communication skills improved more than cognitive skills in Cherokee Indian children as age increased.

It appeared that the developmental curve was different in Cherokee Indian children than that observed in the Caucasian children. Caucasian children's linguistic skills were reported to develop sooner than Cherokee Indian children with little progression from age three to age five (See Figure 2). In the Cherokee Indian children, however, linguistic skills, which were slower to develop at age three, increased significantly by age four and then slowed down (See Figure 2). This same trend is observed in cognitive and socio-communicative skills but to a much lesser degree.

An item analysis of the PDI was performed to determine the category and age level of skills most frequently missed by the Cherokee Indian children (see Table 3). For the two younger age groups, the most frequently missed items were those above age level. The youngest group (37-48 months) most frequently missed items in the cognitive category with linguistic second and socio-communicative last. However, this youngest group missed more age level items in the linguistic category. The 4-year-

Insert Table 3 About Here

olds (49-60 months) most frequently missed items above age level in the cognitive category, while age level items most frequently missed were in the socio-communication category. For the oldest group (61+ months), the most frequently missed items were in the cognitive category with linguistic second and socio-communication last.

The comparatively lower developmental scores observed for the Cherokee Indian children across all three areas may reflect cultural differences in parenting rather than a language delay or disorder since all these children passed a speech and language screening test and were perceived by their teachers to be developing normally. For example, the teachers reported that they could understand the children's speech, the children readily participated in activities, followed directions appropriately, and were cooperative and respectful to the teachers and their peers. It may be that at age three Cherokee Indian parents are not as concerned about their children's linguistic

development as Caucasian parents are; and it is not until the children enter Head Start that their linguistic skills develop rapidly. In the Head Start environment more language is required from the children to participate in the activities. Interacting with the other children would require more talking, too. Nonverbal communication might be misinterpreted until children got to know each other and became familiar with each other's nonverbal behaviors. Social language would be the most different from Caucasian standards since the cultures are different and require different types of behaviors. For instance, Caucasians put more emphasis on talking while American Indians put more emphasis on listening (Harris, 1985).

Another consideration in terms of improvement in the language skills studied may be due to participation of the Cherokee Indian children in Head Start activities. Head Start curriculum has courses and activities based on Caucasian language standards so one would expect to see an improvement in linguistic skills. Cognitive and socio-communication, although improved in the 5-year-old Cherokee Indian children, were still significantly different than their Caucasian peers. In regard to the socio-communication differences, it is speculated that Cherokee Indian parents and teachers in the Head Start programs may model or directly teach some of these social differences because they value these differences. However, in regard to cognition, the Head Start curriculum should provide learning experiences to enhance cognitive skill development to age level. More research into the cognitive differences of Cherokee Indian and Caucasian children appears necessary to determine more precisely what some of these differences are.

Many American Indian children do not perform well on speech-language tests that are standardized on middle-class Caucasian children and have in the past been placed in speech-language therapy. Long (1998) found that 5-year-old Cherokee Indian Head Start children performed in the extremely low range (93.25) of normal on *the Preschool Language Scale-3*. The normal range is from 90 to 110. Of 20 children tested in Long's study, seven performed well below the normal range with poorer performance on verbal expression than on language comprehension. None of these children, however, evidenced a language delay or disorder.

The PDI scores for nonreservation, English-speaking Cherokee Indian children found in this study indicated that the children may score lower on standardized language tests but not be language delayed or language disordered. The PDI, a standardized parent questionnaire screening test, can be part of a speech-language pathologist's battery of language assessment tools to help determine if a potential language problem exists.

Finally, the Cherokee Indian children in this study exhibited a different developmental profile as indicated in the slower development across skills. This is an important point for speech-language pathologists to remember when administering language diagnostic tests to Cherokee Indian Head Start children. Testing at age three may be too soon. It might be better to rescreen periodically for progress during the school year rather than recommending a language diagnostic. For if the child does not meet test standards, he/she may be unnecessarily placed on the special education rolls and remain there for years.

It was recently reported that there are a high percentage of Native American Head Start children receiving speech-language therapy in the northeastern Oklahoma area (personal communication from Bea Dougherty, Disabilities Specialist, Cookson Hills Community Action Head Start, Tahlequah, OK). Consequently, two major questions need to be answered before testing. (1) How and when should testing be done? (2) Should speech-language screening and diagnostic tests standardized on Caucasian children be administered to English-speaking Cherokee Indian Head Start children? If so, which standardized tests would be most appropriate? It is suggested by these authors that local norming of existing standardized Language tests (Evard & Sabers, 1979) at ages two through six may address both these questions. The new norms would then be appropriate for the two through six age range on for this minority culture. From these new standards, speech-language pathologists would be able to determine whether or not an English-speaking Cherokee Indian Head Start child evidenced a language delay and not merely a language difference.

In summary, results from this study indicated that the Cherokee Indian children who participated in this study evidenced the same developmental skills as their Caucasian counterparts, yet may be slower in their development due to several reasons, such as, variations in lifestyles, in geographic differences, cultural differences, and child-rearing practices. It remains to be seen if Cherokee Indian children are uniquely different from children of other nonreservation tribes. It would not be advisable to generalize this study to other tribes across the United States because tribes vary in background, lifestyle, current aspirations, and the influence of the English language. Some tribes live

on reservations, others do not. Some speak only the English language while others are bilingual or multilingual. More studies of language development skills of nonreservation, English-speaking American Indian/Alaska Native children from other tribes across the United States are necessary in order to determine if their developmental profiles are similar to or different than the Cherokee Indian children who participated in this study.

About the Authors

Edgarita Long, Ph.D., is a Pawnee-Wyandotte from Pawnee, Oklahoma. She is an assistant professor in the Communication Disorders Program, Department of Rehabilitation Education and Research, at the University of Arkansas. A clinically certified speech-language pathologist, Dr. Long teaches in the area of language development and disorders with research interests in language assessment of American Indian children.

John M. Christensen, Ph.D., is chair of the Department of Communication Disorders at the University of Tulsa, Tulsa, OK. He teaches courses in stuttering, voice, and medical speech pathology.

References

Bayles, K. A. & Harris, G. A. (1982). Evaluating speech-language skills in Papago Indian children. *Journal of American Indian Education*, 21(2), 11-20.

Blank, M., Rose, S. A., & Berlin, L. J. (1978). *The Language of Learning: The preschool years*. New York: Grune & Stratton.

Brown, C. & Nye, C. (1990, November). "Indirect assessment of developmental milestones." Paper presented at the American Speech-Language-Hearing Association Convention, Seattle, WA.

Brown, R. (1973). *A first language: The early stages*. Cambridge: Harvard University Press.

Bruner, J. (1975). The ontogenesis of speech acts. *Journal of Child Language*, 2, 1-19.

Dore, J. (1975). Holophrases, speech acts, and language universals. *Journal of Child Language*, 2, 21-40.

Dore, J. (1986). The development of conversational competence. In R. Schiefelbusch (Ed.) *Language competence: Assessment and intervention*. San Diego: College-Hill Press.

Evard, B. L. & Sabers, D. L. (1979). Speech and language testing with distinct ethnic-racial groups: A survey of procedures for improving validity. *Journal of Speech and Hearing Disorders*, 44(3), 271-281.

Failing, A. M., Stick, K. K., & Inglebret, E.R. (1993, November). "Speech and language assessment practices used with Native Americans." Poster presentation at the American Speech-Language-Hearing Association convention, Anaheim, CA.

Fluharty, N. B. (1978). *Fluharty Preschool Speech and Language Screening Test*, Austin, TX: Pro-ed.

Goode, P. & Platero, P. (1985). *Apache language assessment*. San Rafael, CA: Linguametrics Group.

Halliday, M.A.K. (1975). *Learning how to mean: Explorations in the development of language*. New York: Arnold.

Harris, G. A. (1993). American Indian cultures A lesson in diversity. In D. E. Battle (Ed.), *Communication Disorders in Multicultural Populations*. Stoneham, MA: Andover Medical Publishers.

Harris, G. A. (1985). Considerations in assessing English language performance of Native American children. *Topics in Language Disorders*, 5(4), 42-52.

Kayser, H. (1996). Cultural/linguistic variation in the United States and its implications for assessment and intervention in speech-language pathology: An epilogue. *Language, Speech, and Hearing Services in Schools*, 27(4), 385-387.

Long, E. E. (1998). Native American children's performance on the *Preschool Language Scale-3*. *Journal of Children's Communication Development*, 19(2), 43-47.

Meisels, S. J. (1989). Can developmental screening tests identify children who are developmentally at-risk? *Pediatrics*, 83, 578-585.

Muma, J. R. (1978). *Language handbook: Concepts, assessment, intervention*. Englewood Cliffs, N.J.: Prentice Hall.

Neely, J. & Christensen, J. M. (1992). *The pediatric developmental inventory: An indirect experimental assessment of cognitive, linguistic, and socio-communicative abilities of children birth to five years of age*. Unpublished master's thesis, The University of Tulsa, Tulsa, OK.

Nye, C. & Brown, C. (1990, July). *Development of an indirect assessment of cognitive, linguistic, and social pediatric milestones*. Paper presented at the Fifth International Congress for the Study of Child Language, Budapest, Hungary.

Nye, C., Al-Amyreh, M., & Marzouka, L. (1996, November). "Early acquisition of communication skills in monolingual Arabic-speaking children." Paper presented at the American Speech-Language-Hearing Association Convention, Seattle, WA.

Piaget, J. (1926). *The origins of intelligence*. New York: International Universities Press.

Piaget, J. (1952). *The language and thought of the child*. London: Routledge & Kegan Paul.

Sonnander, K. (1987). Parental development assessment of 18-month old children: Reliability and predictive value. *Developmental Medicine and Child Neurology*, 29, 351-362.

Taylor, O.L. & Payne, K.T. (1983). Culturally valid testing: a proactive approach. *Topics in Language Disorders*, 3 (3) 8-20.

Toronto, A. S. & Merrill, S. M. (1983). Developing local normed assessment instruments. In Omark, D. R., & Erickson, J. G. (Eds.), *The Bilingual Exceptional Child* (pp. 105-122). San Diego: College Hill Press.

Uzdawinis, D.C. (1983). Let's talk *Screening instrument for Native American children*. Albuquerque: All Indian Pueblo Council, Inc.

Vygotsky, L.V. (1962). *Thought and Language*. Cambridge: MIT Press.

Westby, C. E. (1980). Assessment of cognitive and language abilities through play.

Language, Speech, and Hearing Services in Schools, 11 (3), 154-168.

Wolery, M. (1989). Child find and screening issues. In V. Knight (Ed.), *Assessing Infants and Preschoolers with Handicaps*. Columbus, OH: Merrill & Co.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (1992). *Preschool Language Scale-3*. San Antonio, TX: The Psychological Corporation.

Appendix

PDI Representative Items for Each Age Group

Age Category and Subtest	Representative Items
<hr/>	
37-48 months	
Cognition	My child uses blocks to build houses and fences for other toys or to build roads and bridges for cars.
Linguistic	My child adds -ed or -d to verbs to talk about things that happened in the past.
Social	My child changes his speech according to the age of the listener.
49-60 months	
Cognition	My child plays organized games and makes up new games that have a reasonable well-defined rule structure.
Linguistic	My child connects ideas and thoughts with words like “and”, “if”, “because”.
Social	My child uses language to control and direct other’s activities and to tell someone how to do something.
61+ months	
Cognition	If given a set of circles, squares, and triangles and asked to sort them into groups that “go together”, my child sorts them according to color,

size or shape.

Linguistic My child uses noun words that require the addition of -er (e.g., runner, farmer, drummer).

Social My child uses language to share feelings and attitudes with others.

Table 1

Mean parent reported data by age groups for Cherokee Indian and Caucasian children on the three PDI subtests.

<u>Group</u>		<u>Cognition</u>	<u>Linguistic</u>	<u>Social</u>
37-48 months				
Caucasian	[n=12]	46.7 (3.4)	51.9 (2.2)	34.9 (2.7)
Cherokee	[n=20]	40.4 (2.4)	42.2 (4.0)	27.2 (2.6)
Difference		6.3	9.7	7.7
49-60 months				
Caucasian	[n=15]	50.6 (1.9)	53.6 (1.5)	36.7 (1.4)
Cherokee	[n=19]	45.3 (2.5)	49.8 (3.3)	32.4 (2.5)
Difference		5.3	3.8	4.3
61+ months				
Caucasian	[n=10]	51.6 (1.5)	54.6 (0.6)	37.8 (0.4)
Cherokee	[n= 9]	48.2 (3.8)	52.7 (3.4)	35.0 (2.8)
Difference		3.4	1.9	2.8

Note: Standard deviations are in parentheses.
 Social = Socio-Communication

Table 2

Two-way ANOVA data comparing the performance of Cherokee Indian and Caucasian children in three age categories on the PDI.

Age Category	Variance Source	df	F	p
37-48 months	Group	1,30	60.043	.0000
	Tests	2,60	1227.553	.0000
	GT	2,60	13.030	.0000
49-60 months	Group	1,31	27.061	.0000
	Tests	2,62	1727.699	.0000
	GT	2,62	4.688	.013
61+ months	Group	1,17	6.408	.022
	Tests	2,34	1458.551	.0000
	GT	2,34	2.652	.085

Table 3

Frequency of missed items by age and category for Cherokee Indian children.

Category	37-48 months	49-60 months	61+ months

Cognition			
Below age level	0	3	5
Age level	36	13	50
Above age level	236	150	*
Linguistic			
Below age level	6	7	4
Age level	91	10	20
Above age level	159	97	
Socio-communication			
Below age level	6	4	7
Age level	69	40	20
Above age level	140	62	*

*No items above age level included on the PDI.

Figure 1. PDI Cognition subtest performance scores for Caucasian children and Cherokee Indian children aged 37-48 months, 49-60 months, and 61+ months.

Figure 2. PDI Linguistic subtest performance scores for Caucasian children and Cherokee Indian children aged 37-48 months, 49-60 months, and 61+ months.

Figure 3. PDI Socio-communication subtest performance scores for Caucasian children and Cherokee Indian children aged 37-48 months, 49-60 months, and 61+ months.