

A COGNITIVE ASSESSMENT FOR PRESCHOOL CHILDREN: THE COGNITIVE  
ABILITY SCALE-GHANAIAAN VERSION

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## ABSTRACT

### A COGNITIVE ASSESSMENT FOR PRESCHOOL CHILDREN: THE COGNITIVE ABILITY SCALE-GHANAIAAN VERSION

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Preschool experiences have been demonstrated to improve the cognitive outcomes of young children including those with cognitive delays. However, to augment the positive effects of preschool experiences, there is a need for cognitive assessments. Results from these assessments can be useful in identifying children with cognitive delays and in identifying the unique strengths and difficulties children possess. Such information can aid in planning individualized interventions for preschool children.

Unlike in the United States, there is a lack of cognitive tests for preschool children in several parts of the world including Ghana. This makes it difficult to accurately identify Ghanaian children with cognitive delays as well as identify the strengths and difficulties of other Ghanaian preschoolers. Information from such tests can enhance the preschool experience.

In light of this need, this study adapted the Cognitive Abilities Scale-Second Edition (CAS-2) Preschool Form for 2- and 3-year-olds, into a form useful for Ghanaian preschool children. The Ghanaian version of the test was adapted in English to be consistent with the Ghanaian culture, and translated and adapted in Twi, the most widely spoken native language in Ghana. A sample of 22 English-speaking-Ghanaian-children ages 24 to 47 months and residing in Accra as well as 23 Twi-speaking-Ghanaian-children ages 24 to 47 months residing in Koforidua participated in this study. The CAS-2:GH- English and CAS-2:GH- Twi were administered by the author to the children at their preschools.

The technical adequacy results for both the CAS-2: GH-English and CAS-2: GH-Twi were similar to technical adequacy results for children from the U.S. norm sample for the

original CAS-2. For the overall General Cognitive Quotient, reliability results were strong for internal consistency, short-term stability and inter-examiner reliability. Item difficulty results indicate both versions of the CAS-2 had some very easy, some very difficult items and many items that fell within the acceptable difficulty range. Item discrimination results exceeded the minimum considered acceptable for both forms. Item analysis results indicated areas where additional modifications might be made to further improve the usefulness of both the translation and adaptation. Limitations of this study and suggestions for further research are discussed.

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## CHAPTER I

### INTRODUCTION

Preschool attendance has been shown to be beneficial in improving the cognitive outcomes of typically developing children. Winsler, Tran, Hartman, Madigan, Manfra, and Bleiker (2008) demonstrated the effect of pre-kindergarten educational programs on poor and ethnologically diverse children. This study involved 3,838 preschoolers age 4, receiving early educational childcare services with or without subsidies, and who were part of the Miami School Readiness Project. Results of the study showed the children improved in kindergarten readiness skills compared to national norms despite the fact that they were poor and from ethnologically diverse backgrounds.

To maximize the benefits of a preschool experience it may be helpful to identify children who have special needs as well as those whose abilities may be obscured by problems with attention or language, for example. Once identified, preschool instructional programs can be developed to meet the idiosyncratic needs of these children. Results from cognitive measures, particularly those with educationally relevant items, can be used along with information from caregivers, to plan instruction considering a child's strengths as well as difficulties in learning.

When the term *cognitive* is used in this study, it refers to both tests typically considered intelligence tests as well as achievement tests. Anastasia and Urbina (1997) suggested it is not possible to make a rigid distinction between intelligence and achievement tests. They indicated that intelligence tests usually are thought of as reflecting skills acquired under uncontrolled conditions whereas achievement test results are usually considered a reflection of examinees' skills under more controlled circumstances. Also, the terms *intelligence* and *cognition* are sometimes used interchangeably. When the focus is preschool children it is especially difficult

to differentiate among the concepts of *intelligence*, *cognition* and *achievement* because a great deal of what preschoolers learn is under uncontrolled circumstances.

In the United States several cognitive tests have been published for preschoolers (Lichtenberger, 2005; Blaga, Shaddy, Anderson, Kannass, Little, & Colombo, 2009; Allen, 2005). Many other countries, however, do not have these tests for young children because the field of psychological assessment in these countries has not developed sufficiently to allow for the development of psychological tests. Other reasons for the lack of psychological tests are that development of such tests are costly and time consuming.

One option for these countries is to adapt existing tests used in other cultures and countries. Adaptation of tests for use in other languages and cultures may be beneficial because it is cost effective and fast (Geisinger, 1994; Hambleton & Patsula, 1998). Test adaptation is also useful for evaluating results of cross-cultural studies (Hambleton & Patsula, 1998; Van de Vijver & Poortinga, 1982).

Ghana is a country where test adaptation would be useful. This country lacks the financial resources needed to develop new tests. Ghana is in immediate need of reliable and valid means of identifying members of its populace with psycho-educational difficulties including preschool aged children without access to preschools or who may be developmentally delayed. There are a few psychological tests normed on the Ghanaian population. These include the Multidimensional Aptitude Battery (MAP; Debra, 2003), the Ravens Progressive Matrices (RPM; Bulley, 1973) and the Revised Quick Cognitive Screening Test (RQCS; Mate-Kole, Conway, Catayong, Bieu, Sackey, Wood, & Fellows, 2009). None of these tests, however, are appropriate for preschoolers. Review of the *Journal of Psychology in Africa*, *African Journal for the Psychological Study of Social Issues*, *Journal of Black Psychology*, *Journal of Pan*

*African Studies* and the *Journal of Psychoeducational Assessment* did not yield any information on cognitive assessment instruments for young children in Ghana.

Cognitive assessment of children in developing countries like Ghana is not only difficult because of the scarcity of tests for young children but also because of lack of uniform exposure to quality preschool education for many children; particularly 2- and 3-year-olds. UNICEF (2013) reported that about 34.2 percent of Ghanaian children at the age of 3 attend preschool. Enrollment of children from ages 3 to 5 is very low (UNICEF, 2013). Data on the percentage of 2-year-olds enrolled in preschool are lacking because preschool education is considered to begin at age 3 in Ghana.

Development of cognitive tests for young children in developing countries like Ghana is important in identifying children who have cognitive delays. Alcock, Holding, Mung'ala-Odera, and Newton (2008) noted that pediatricians, teachers or clinicians typically identify children who are delayed in developing countries. They use their general observations as a basis for these decisions. Such methods are problematic because usually only children with extreme delays are likely to be identified. These methods also may incorrectly identify children whose difficulties in school are because of behavioral or emotional problems and not cognitive delays (Kenya Institute of Special Education, 1984). Children with cognitive delays are typically identified by teachers and doctors in Ghana. There is, therefore, a need for cognitive tests for preschool children, especially those with little or no preschool education in order to have a reliable and valid means of determining which Ghanaian preschoolers may need individualized early psycho-educational interventions.

Further, Dixon (2006) reported that 37 percent of Africans in the United States are from West Africa, and Ghana is one of the countries with the most immigrants from this region. Thus,

an appropriate test for newly immigrated Ghanaian preschoolers in the United States is also needed so that these children may receive valid assessments of their skills.

Constructing cognitive tests for children who have not attended preschool programs may also be useful for migrant children in Ghana who have not been exposed to much formal education. This is because such tests will provide a valid means of identifying newly migrated Ghanaian children with cognitive delays as well as information on their strengths and difficulties. Bracken and Barona (1991) noted a scarcity of instruments for migrants in countries where there is considerable immigration. An example of such a country is Ghana.

#### Steps in Test Translation

Bracken and Barona (1991) described the following procedures for adapting and translating tests into another language that help to ensure the translation and adaptation will be similar to the original test.

#### Translation from the Source Language to the Target Language

First, a translator for the test should be conversant in both languages and familiar with the ideas the test measures. The translation into the target language should not be easier than the original or source language. The goal is for the translation to be of the same difficulty as in the source language, but with adaptations to address cultural differences. This step involves the initial translation of the original test from the source language into the target language by a translator who is well versed in both languages and is educated enough to understand the ideas and language used in test batteries.

### Blind Back-Translation

Next, the translation should be translated back into the source language. The person who does this translation should be unfamiliar with the source test, conversant in both languages, and understand the ideas the test measures. The back translation and original version should then be compared considering similarity of sentence structure, difficulty of vocabulary, and the concepts assessed.

### Translation-Back-Translation Repetition

To address differences found between the forms of the tests, the translation and back translation should be repeated to decrease any differences.

### Bilingual Review Committee

Next, the product of the translation-back-translation should be examined by a multi-regional panel. This examination determines if the translated version of the test is useful for the target population. The panel should review the test directions and stimuli to ensure they will be understandable and recognizable by the target audience.

### Pilot Testing

The approved translation by the multi-regional panel should then be administered to a representative sample of the target population. This administration should be done by an examiner familiar with the target language and the procedures involved in psychological assessments. During the test administrations, examinee's responses to test stimuli should be examined for items indicative of faulty translations. Those items should be examined further by

the panel and additional modifications made to make the test more useable by the target population.

#### Recommendations for Choosing a Test to Be Adapted

Bracken and Barona (1991) suggested that if tests selected for translation meet Werner and Campbell's criteria (1970), the adapted versions of those tests typically do not differ from the original language. Werner and Campbell's (1970) criteria are: test items consist of uncomplicated sentences, pronouns should be avoided in test items and test directions, vernacular and analogies should be avoided, and phrases based on assumptions and conditionalities should not be used to develop test items.

Knapp (1960) proposed use of untimed tests for assessing examinees from different cultures because timed tests may be unfavorable to such examinees. Spilka (1968) suggested that tests with concepts familiar in both the source and target cultures are more accurately translated. Keston and Jimenez (1954) noted that adapted assessments are more valid if they assess receptive rather than expressive skills.

#### Additional Considerations for Adapting Tests

Bracken and Barona (1991) suggested additional consideration to make an adapted test more similar to the original version.

## Examiners

The examiner should be conversant enough with the target language to recognize all acceptable responses. Differences in dialect may result in various correct responses for test items.

Another factor to be considered with respect to language is that examinees who are bilingual may not be sufficiently proficient in the target and source languages. Thus, if the examiner is sufficiently proficient in both languages, this would make it possible to assess the child in both languages.

## Cultural Influences

Use of the accepted code of conduct in the examinee's culture may influence examinee's behavior during test administration and may affect the test results. For example, in more conservative cultures where children are deemed as rude for asking people in authority to repeat a question, examiners may incorrectly interpret the lack of response from such children as lack of knowledge.

The following recommendations for test adaptation are suggestions from the International Test Commission (2010).

## Test Development and Adaptation

Because culture and language greatly affect an individual's performance on a test, the International Test Commission (2010) suggests that test adapters make efforts to reduce the influence of cultural and linguistic variables when adapting tests. The Commission (2010)

suggested that during test development, test developers should make sure test materials and instructions used in the new culture are suitable for that culture.

### Interpreting Scores

When tests are adapted, information should be provided about changes made to the original test and documentation of equivalence between the original and adapted tests should be provided (The International Test Commission, 2010). Interpretation of the adapted test should take into account the social, cultural and environmental factors that may influence the results. Information also should be provided regarding how these factors might influence the results.

### Purpose of the Study

The aim of this study was to adapt a Cognitive Abilities Scale-Second Edition (CAS-2; Bradley-Johnson & Johnson, 2001) for 2- and 3-year-olds standardized and published in the United States for use with Ghanaian preschoolers. Two versions of the test were developed: one was in English and the other in Twi. The rationale for the English version is that English is the language of instruction in Ghanaian schools. Although that original test is also in English, some adaptation is required because the English spoken in the United States has cultural and linguistic differences from the English spoken in Ghana. The rationale for the Twi version is that Twi is the most widely spoken native language in Ghana, particularly for low-income children. The suggestions of Bracken and Barona (1991) and the International Test Commission (2010) were followed as much as possible in developing the translation and adaptation.

The Cognitive Abilities Scale- Second Edition (CAS-2; Bradley-Johnson & Johnson, 2001) was selected as the test to be adapted and translated. This norm- reference test measures

cognitive abilities in young children from 3 months through 3 years. One reason the CAS-2 was selected is that the test results correlate highly with both intelligence and achievement measures and the educational usefulness of each item is addressed in the examiner's manual. Thus, this test can provide information to assess the cognitive ability of young children as well as provide information relevant to instructional planning.

According to Bracken and Barona (1991), tests inclined to produce mistakes in their source language are also inclined to produce mistakes in the target language. Consequently, tests to be adapted should be technically adequate or the adapted test will also be technically flawed. The CAS-2 has good technical adequacy. For example, CAS-2 results have been shown to be reliable over time for children from 2 to 3 years of age (HaileMariam, 2004). Support for the test's concurrent, criterion-related, and predictive validity is presented in the test manual and also has been demonstrated in other studies (e.g., Swanson, Bradley-Johnson, and O'Dell, 2009).

Because examinees from different cultures perform better on receptive than expressive language tasks in cross-cultural studies, Keston and Jimenez (1954) suggested that when adapted tests assess receptive rather than expressive skills, they produce more accurate results. Another reason for selecting the CAS-2 is that it yields both a vocal and a non-vocal quotient. The non-vocal quotient enables the test to be used with children who will not talk, are non-vocal or have unintelligible speech.

Knapp (1960) noted that timed tests may be unfavorable for examinees from other cultures. As such the use of the CAS-2 is advantageous because none of the items are timed.

The study examined the internal consistency and test-retest reliability of both versions of the CAS-2: GH-English and CAS-2: GH-Twi. In addition, the item difficulty and item discrimination of the CAS-2: GH-English and the CAS-2: GH-Twi were examined. The

perception of teachers on the usefulness of the CAS-2: GH-English and CAS-2: GH-Twi results were also obtained.

## CHAPTER II

### METHOD

#### Participants

A sample of 47 children ages 2-0 through 3-11 enrolled in four preschools, participated in this study. Twenty-two children were from two preschools in Accra in the Greater Accra region of Ghana, and 23 were from two preschools in Koforidua in the Eastern region of Ghana. Children from Accra were chosen because it is the capital of Ghana, and children who live there are likely to have greater access to preschools and quality education. Children from Koforidua were chosen because these children are likely to be native Twi speakers.

Participants' demographic characteristics are shown in Table 1. Of the 47 participants, 45 completed the test. Two children were not able to complete the test in spite of assistance from the teacher's aide. One child appeared extremely shy and unwilling to participate despite efforts by the examiner to build rapport with the child. The other child appeared to have difficulty understanding the directions in both English and Twi.

The majority of participants were 3-year-old girls. All participants as well as their parents were Ghanaian. All participants were bilingual; speaking some English in addition to at least one native language. Information requested on parents' educational levels was not provided by most parents, thus, this information is unknown. Based on information shared by parents before testing, one participant was suspected of having a developmental disability.

Table 1. Demographic Characteristics of Participants (*N* = 45)

Characteristics		Percentage for English Speaking Sample (n = 22)	Percentage for Twi Speaking Sample (n = 23)
Gender			
	Boys	40	30
	Girls	60	70
Age in Months			
	24-35	50	30
	36-47	50	70
Ethnicity			
	Ghanaian	100	100
Residence			
	Urban	100	100
Mother's knowledge of English			
	Speaks English	100	74
	Does not speak English	0	26
Father's knowledge of English			
	Speaks English	100	87
	Does not speak English	0	13

## Instrumentation

### Cognitive Abilities Scale-Second Edition (CAS-2)

The CAS-2 (Bradley-Johnson & Johnson, 2001) consists of two forms: the Infant Form (3-23 months) and the Preschool Form (24-47 months). The CAS-2 Preschool form was used in this study.

The Preschool Form assesses oral language, reading, mathematics, handwriting and enabling behaviors. Enabling behaviors assesses memory and imitation. Overall results are expressed as a General Cognitive Quotient (GCQ;  $M = 100$ ,  $SD = 15$ ). For children unable or unwilling to speak or whose speech cannot be understood, there is a Non-vocal Cognitive Quotient (NCQ;  $M = 100$ ,  $SD = 15$ ) option based on test items that do not require vocalization. Both results can also be expressed as percentiles or age equivalents.

Normative data were collected for 1,106 children from October 1997 through August 1999, with 248 to 305 children for each age level. The sample was similar to the 1997 U.S. Census data in terms of geographic distribution, gender, race, ethnicity, urban/rural residence, and educational background of the parents. The sample included children with disabilities. The demographic information is representative across different age levels.

Information on internal consistency is presented for 3-month intervals with correlations for the GCQ for children 24-47 months ranging from .93 to .94. Correlations for the NCQ were .88-.93 for children 24-47 months. Information on test-retest reliability is presented in 1-year intervals. Correlations were .96 and .98 on the GCQ and NCQ respectively for 2-year-olds and .94 and .92 on the GCQ and NCQ respectively for 3-year-olds. For inter-scorer reliability, correlations were also presented by 1-year intervals. Seventy nine children were assessed and

resulting correlations were .99 for both 24 through 35-month-olds and 36 through 47-month-olds.

Content validity was addressed by selecting items important for the intellectual development of young children. The content validity of each item is addressed in the manual. According to the manual, timed items were excluded because the speed with which a child can perform a skill does not seem to provide important information for a young child and observing a stopwatch interferes with an examiner's ability to observe the child during assessment.

When the preschool form of the CAS-2 GCQ and NCQ were compared with the Bayley Scales of Infant Development-Second Edition (Bayley, 1993), concurrent validity correlations were .82 and .86 respectively. Correlations with the Pictorial Test of Intelligence-Second Edition (French, 2001), were .67 for the GCQ and .80 for the NCQ. Comparisons with the Performance subtests of the Wechsler Preschool and Primary Scale of Intelligence-Revised (Wechsler, 1989) produced results of .77 and .87 respectively. Correlations of the GCQ with the Detroit Test of Learning Ability-Primary: Third Edition (DTLA-3; Hammill & Bryant, 2005) and the Test of Early Language Development-Third Edition (TELD-3; Hresko & Hammill, 1999) are .86 and .77 respectively for children from 3-0 to 3-10.

In terms of construct validity, participants' scores were shown to increase with age. Results of European American, African American, and scores of children of both genders were all in the average range. Scores for children with physical disabilities also were in the average range; whereas results for children with cognitive disabilities were below the average range. For 3-year-olds, achievement scores on the CAS-2 correlated highly with the Test of Early Reading Ability-Second Edition (TERA-2; Reid, Hresko, & Hammill, 1989) and the Test of Early Mathematics Ability-Second Edition (TEMA-2; Ginsburg & Baroody, 1990). Swanson,

Bradley-Johnson, Johnson and O'Dell (2008) evaluated the concurrent validity of the CAS-2 for 2-year-olds with the Bayley Scales of Infant Development-Second Edition (Bayley, 1993) and construct validity of the CAS-2 for 2-year-olds with the Adaptive Behavior Assessment System-Second Edition (ABAS-2; Harrison & Oakland, 2003). Correlations were .63 and .65 respectively. For 3-year-olds, they evaluated the concurrent validity of the CAS-2 with the Detroit Test of Learning Ability: Third Edition (Hammill & Bryant, 2005) and the construct validity of the CAS-2 with the Test of Early Language Development-Third Edition (Hresko & Hammill, 1999). Correlations were .86 and .77 respectively. They also found the CAS-2 predicted performance of 2- and 3-year-olds six years later on the Wechsler Intelligence Scale for Children-Third Edition (Wechsler, 1991) with a correlation of .72. Floors of the CAS-2 are adequate beginning at 3 months and the test does not have problems with item gradients.

Overall the CAS-2 has good technical adequacy and is particularly useful for young children who will not or cannot vocalize or produce intelligible speech because it has a non-vocal quotient. The test has a nationally representative sample and good internal consistency and inter-scorer reliability for each age level. Reliability coefficients for stability are .92 or higher for ages 2 and 3. In terms of validity, the CAS-2 correlates well with other measures such as the Bayley Scales of Infant Development-Second Edition and Pictorial Test of Intelligence-Second Edition. It also has good predictive validity over a six-year period. The test has adequate floors and item gradients and does not have timed items.

## Adaptation Process

The procedures for adapting the CAS-2 for 2- and 3-year-olds from Ghana consisted of several steps, consistent with the recommendations of Bracken and Barona (1991) for adapting tests for children speaking languages different from that used in standardizing the test. Table 2 describes their suggested translation procedures and how each was addressed in this study. Table 3 describes their criteria for test selection and how the CAS-2 addresses these criteria.

Table 2. Translation Criteria and Procedures Used in this Study

Steps in Translation	Procedures Used
Source to target language translation	A bilingual translator completed the original translation from English to Twi
Blind back translation	A bilingual translator translated the test back into English; one back translation was used.
Bilingual review committee	This was not possible to carry out for this study
Pilot testing	Pilot testing with three children was completed and revisions were made based on the children's responses

Table 3. Test Selection Criteria and the CAS-2

Test Translation Criteria	CAS-2
Items should consist of simple sentences	The test items contained simple easy-to-understand sentences
Pronouns should be avoided	Few pronouns are required
Metaphors should be avoided	No metaphors are used in the test
Limited verbal responses	The test has a nonvocal option
Items should not be timed	No items are timed

The details of the adaptation were as follows. The Ghanaian version of the CAS-2 (CAS-2: GH) was developed via the suggestions of Brislin (1970) and Bracken and Barona (1991). The test was back-translated by a master's level student of the Twi language, who was also a native Twi speaker. Based on his recommendations, some items were modified based on cultural and linguistic differences and usefulness. The changes for the Adapted Version for Ghanaian English Speakers were:

- For Oral Language items 1, 2 and 10, the *links* used to test position concepts were changed to *coins*. The *links* were unfamiliar to Ghanaian children; coins are more familiar and served the same purpose as the links.
- For Oral Language items 4 and 6, the *ramp* was termed a *bridge*. The term *ramp* is less familiar to Ghanaian children; *bridge* is more familiar and served the same purpose as *ramp*.

- For Oral Language items 16, 18 and 20, the items *hammer*, *wagon*, and *ladybug* were changed to *axe*, *car*, and *butterfly* respectively; concepts similar to *hammer*, *wagon*, and *ladybug* but which are terms more familiar to Ghanaian children.
- For Oral Language item 19 the picture of the *sock* was changed to a white sock because most pupils are expected to wear white socks in Ghana rather than multi-colored socks.
- For Oral Language items 22, 23 and 24, the terms *coffee* and *coffee pot* were changed to *water* and *bottle*. *Coffee* and *coffee pot* are unfamiliar to Ghanaian children.
- On the Reading section item 5, the name *Toby* in the story was changed to *Kofi* which is a common male Ghanaian name.
- Mathematics items 18, 20, 21 and 22, the *links* were changed to *coins*. The term *links* was unfamiliar to Ghanaian children and coins are more familiar and served the same purpose as the links.
- On the Enabling Behaviors section, some items were changed because the sentences contained unfamiliar words. For example, for item 7a, the sentence *I like milk* was changed to *I like water* because milk is typically used with tea and Ghanaian children from impoverished backgrounds are unlikely to have access to milk. Similar changes were made to other sentences to be more consistent with Ghanaian culture.

The changes for the Adapted Version for Twi Version:

The same changes noted above for the English version of CAS-2 were made for the Twi version. However, because of differences between the English and Twi languages several additional changes described below also were made to the Twi version.

- Oral Language items 23 and 24 assess knowledge of pronouns. The instructions had to be changed to assess gender neutral pronouns because in the Twi language there is no pronoun to indicate gender such as *him* or *she*. These items were assessed in English for children who missed these items when the items were presented in Twi.
- For Oral Language item 29, the article *a* was omitted because in the Twi language there are no articles such as *a* or *the*. Instead, this item was changed to assess use of the word *one* in a sentence. For example, in Twi, *This is a cup* is said as *This is one cup*. Additionally, for children who missed the item the question was asked again in English.
- On the Reading, item 15; *Say C*, was removed because the letter C does not exist in Twi. The Reading, items 8, 10, 12, 14 and 16 were removed because letter sounds do not exist in Twi. These items were tested in English to provide children the opportunity to demonstrate their knowledge.

A pilot study with 3 English-speaking children was conducted to determine how well the children would understand, follow and use the test instructions and materials. All three children were able to follow the instructions and use the materials appropriately.

## Procedure

Seven preschools in Accra and Koforidua were contacted regarding the study and sent the Preschool Administrator Cover Letter and Consent Form (See Appendices A and B). Four of the seven administrators agreed to participate. All four preschools were private and the owners granted permission for data collection.

Directors were given a written consent form describing the study (See Appendix B.). For those who agreed to participate, information explaining the study as well as consent forms were sent to them to distribute to parents of 2- and 3-year-olds who attended their programs (See Appendix C for this form.). Sixty consent forms were distributed; only children whose parents signed and returned the consent form were included in the study. Forty-seven consent forms were returned.

A table and a child-size chair were provided but testing was done outside in a quiet open space in front of the child's classroom for the English speaking sample. For Twi speaking children; because of difficulties in finding space for testing, testing was done either in the headmaster's office or in an open area near the child's classroom. The researcher was accompanied by the teacher's aide during the testing sessions. The teacher's aide provided assistance by redirecting the children who were not being tested. During testing of some children, several teachers observed the testing sessions to learn more about the test. It is the examiner's opinion that the teacher's presence did not appear to interfere with the children's performance. However, in the examiner's opinion the headmaster's presence affected the performance of children who were tested in his office. For example, some children presented as timid by speaking very quietly, avoiding eye contact with the examiner, avoiding looking in the direction of the headmaster and fidgeting with their clothing. Additionally, for the Twi speaking

sample, crowds of children gathered around those children who were tested about lunchtime. In the examiner's opinion presence of the other children caused some anxiety for children assessed around lunchtime. Similar to the children assessed in the headmaster's office, these children presented as timid; they spoke very quietly, fidgeted with their clothing and required encouragement to focus on the activities. Each assessment session lasted for about 25-30 minutes.

A child's dominant language was determined by asking the children's classroom teachers to indicate whether the child should be assessed in English or Twi. However, because all children were bilingual, correct answers in either language were given credit.

Parents were given a written summary report describing skills their child demonstrated on the CAS-2:GH English and CAS-2: GH Twi as well as skills that would be appropriate to practice next with their children. Because at least one parent of each child was able to speak English, a report written in English was provided for each child.

The three preschool teachers who agreed to participate in the study were asked to examine each item on the CAS-2 preschool form and identify any item they thought might be problematic for children in their programs. The examiner followed up with the teachers to ask why they thought some items were inappropriate. The item difficulties of these items were compared with the teachers' opinions.

To examine the stability reliability of the CAS-2: English and CAS-2: Twi, half of the children from each age level in the study were retested. The children retested were selected randomly and the test was administered 13 days after the initial administration.

To examine inter-examiner reliability, another psychologist independently scored 25% of the protocols for each measure. The other psychologist was present during the testing and independently scored the protocol.

## CHAPTER III

### RESULTS

For both versions of the CAS-2: Ghanaian test (CAS-2: GH) raw scores were converted to quotients (mean = 100, SD = 15) using the CAS-2 U.S. norm tables for the purpose of comparing the performance of the two Ghanaian samples to the CAS-2 U.S. norms. The means and the standard deviations for both the English-speaking and Twi-speaking children as well as data for both groups by age level appear in Tables 4 and 5.

Means for the CAS-2: GH-English speaking children fell in the average range for both the overall composite (GCQ) and the nonvocal composite (NCQ) for both age levels. For the CAS-2: GH-Twi, means for the GCQ fell in the poor to below average range; however, when speech was not required, their means fell in the below average to average range.

Except for the GCQ for 2-year-olds, standard deviations for the English speaking children were restricted, ranging from 10 to 13. For the Twi speaking children this also was the case, except for 3-year-olds on the GCQ where the standard deviation was 15.

Table 4. CAS-2: GH-English Means and Standard Deviations (*SD*)

	Mean ( <i>SD</i> )	
	GCQ	NCQ
Overall ( <i>N</i> = 22)	95 (13)	94 (10)
2-year-olds ( <i>n</i> = 11)	93 (15)	92 (10)
3-year-olds ( <i>n</i> = 11)	96 (11)	96 (10)

GCQ-General Cognitive Quotient; NCQ-Nonvocal Cognitive Quotient

Table 5. CAS-2: GH-Twi Means and Standard Deviations (*SD*)

	Mean ( <i>SD</i> )	
	GCQ	NCQ
Overall (N = 23)	79 (12)	88 (11)
2-year-olds (n = 8)	82 (13)	90 (13)
3-year-olds (n = 15)	75 (15)	86 (10)

GCQ-General Cognitive Quotient; NCQ-Nonvocal Cognitive Quotient

Results from a paired t-test on the overall CAS-2: GH-English data indicated the NCQ, which did not require the children to speak, was not significantly different from the GCQ, ( $t = -0.08$  ( $df = 21$ ),  $p < .05$ ). Additionally, for the English-speaking sample, the standard deviation for the GCQ was somewhat larger (13) than the standard deviation for the NCQ (10), suggesting when speech was required scores were more variable than when it was not.

In contrast, results from a paired t-test comparing the CAS-2: GH-Twi NCQ with the CAS-2 GH-Twi GCQ, showed a significant difference, ( $t = -6.89$  ( $df = 22$ ),  $p < .05$ ). In this case the NCQ was significantly higher than the GCQ. Thus, for children whose primary language was Twi, their overall performance on the test was higher when no expressive oral language was required. Their overall standard deviations for the GCQ (12) and NCQ (11) were similar.

Results from a paired t-test on the overall CAS-2: GH-English with the overall CAS-2: GH-Twi data indicated the GCQ for English-speaking-Ghanaian children was significantly higher than the GCQ for Twi-speaking-Ghanaian children, ( $t = 3.81$  ( $df = 21$ ),  $p < .05$ ). Additionally, the standard deviation for the GCQ (13) of the English-speaking-Ghanaian children was similar to the GCQ (11) of the Twi-speaking-Ghanaian children. Similarly, results from a paired t-test on the overall CAS-2: GH-English with the overall CAS-2: GH-Twi data indicated the NCQ for

English-speaking-Ghanaian children was significantly higher than NCQ, for Twi-speaking-Ghanaian children ( $t = 2.29$  ( $df = 21$ ),  $p < .05$ ). Thus, when no verbal responses were required the performance of English speaking children was also significantly higher than the performance of children who spoke Twi. Additionally, the standard deviation for the NCQ (11) for English-speaking-Ghanaian children was similar to the NCQ (11) of for the Twi-speaking-Ghanaian children.

Inter-examiner reliability was examined using item-by-item comparisons. Inter-examiner reliability was determined by dividing the total number of agreements by the number of agreements plus disagreements for each version of the test. The average inter-examiner agreement was 97.7% for the CAS-2: GH-English and 96% for the CAS-2: GH-Twi, indicating very high inter-examiner agreement.

Internal consistency of the CAS-2: GH for both the English and Twi samples was evaluated using Cronbach's (1951) coefficient alpha. Results are presented in Table 6 along with data for the original CAS-2 U.S. norm sample. Salvia and Ysseldyke (2007) suggested when tests are used to make important decisions about students, e.g., for purposes of diagnosis or placement, a correlation of at least .90 is needed. Thus, a minimum of .90 was used to evaluate reliability data.

Results for the English-speaking sample indicate the internal consistency correlation for the GCQ for the English-speaking sample of Ghanaian children was .91 and .82 for the NCQ. Internal consistency for the CAS-2: GH-English was slightly lower than the internal consistency results for the U.S. sample for the GCQ, but results were above the minimum for acceptable reliability. For the NCQ, results were lower than the US sample and the correlation was less than .90.

Results for the Twi-speaking sample indicate the internal consistency correlation for the GCQ for the total sample of Ghanaian children was slightly lower than the internal consistency results for the U.S. sample; however, it was sufficiently reliable. For the NCQ results were lower than the U.S. sample and the internal consistency correlation was less than .90.

Table 6. Coefficient Alphas for CAS-2

Type of Score	Overall English-Speaking Sample	Overall Twi-Speaking Sample	Overall for U.S. Sample
General Cognitive Quotient	.91	.90	.94
Nonvocal Cognitive Quotient	.82	.82	.90

The standard error of measurement (SEm) for the two samples of Ghanaian children appears in Tables 7 and 8 along with the SEms for the CAS-2 U.S. sample. For the English speaking sample of 2-year-olds, the GCQ SEm was higher than the U.S. norm sample, but for 3-year-olds the GCQ SEm was lower than the U.S. norm sample. Compared with the U.S. norm sample, the amount of error associated with the NCQ for the English-speaking sample was lower for both ages 2 and 3.

Table 7. Standard Error of Measurement for CAS-2: English

Type of Score	English-Speaking 2-year-olds	U.S. 2-year-olds	English-Speaking 3-year-olds	U.S. 3-year-olds
GCQ	5	24-29 mos = 4; 30-35 mos = 4	3	36-41 mos = 4; 42-47 mos = 4
NCQ	3	24-29 mos = 4; 30-35 mos = 5	3	36-41 mos = 5; 42-47 mos = 5

GCQ-General Cognitive Quotient; NCQ-Nonvocal Cognitive Quotient

In the Twi speaking sample of 2-year-olds, the GCQ SEM was the same as the U.S. norm sample, but for the 3-year-olds, the GCQ SEM was lower than the U.S. norm sample. For 2-year-olds, the NCQ SEM was similar to the U.S. norm sample but for 3-year-olds, the NCQ SEM was lower than for the U.S. norm sample.

Table 8. Standard Error of Measurement for CAS-2: Twi

Type of Score	Twi 2-year-olds	U.S. 2-year-olds	Twi 3-year-olds	U.S. 3-year-olds
GCQ	4	24-29 mos = 4; 30-35 mos = 4	3	36-41 mos = 4; 42-47 mos = 4
NCQ	5	24-29 mos = 4; 30-35 mos = 5	3	36-41 mos = 5; 42-47 mos = 5

GCQ-General Cognitive Quotient; NCQ-Nonvocal Cognitive Quotient

To evaluate test-retest reliability of both the English and Twi versions of the CAS-2: GH, the Pearson Product Moment Correlation was used. Ages 2 and 3 were combined for these results because of the small sample size for 2-year-olds in both the English and Twi samples. Results are presented in Table 9, along with the means and standard deviations. For both the English and Twi versions correlations were above .90 for both the GCQ and NCQ. These data indicate both versions of the CAS-2: GH results are very stable over a 13-day interval. These correlations are similar to those for the CAS-2 where correlations ranged from .92 to .98.

Table 9. Test-Retest Reliability Coefficients for CAS-2: English Quotients

CAS-2 Quotients	First Testing		Second Testing		Correlation <i>r</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
CAS-2: English( <i>n</i> =22)					
GCQ	94	12	93	11	.98
NCQ	96	11	97	11	.98
CAS-2: Twi ( <i>n</i> =23)					
GCQ	97	11	97	11	.98
NCQ	96	11	96	11	.97

GCQ: General Cognitive Quotient; NCQ: Nonvocal Cognitive Quotient

Results of item difficulty analyses and item discrimination are presented in Tables 10 through 14. Item difficulty and item discrimination constitute item analysis. Item difficulty

refers to the proportion of children who pass a particular item and indicates whether an item is very easy or very difficult. Mean item difficulty should be approximately 50% and percent of difficulty should be moderately widely dispersed (Anastasi & Urbina, 1997). Brown, Wiederholt, and Hammill (2009) suggested ranges from 15% to 85% are acceptable for item difficulty.

As shown in Table 10, the median percentage of item difficulty for the total English-speaking-Ghanaian sample is 45% and in the acceptable range. Results for the median item difficulty for the total sample and for each age group of the English-speaking sample were similar to results for the CAS-2 U.S. norm sample. As expected, for all three samples of children there were more difficult items on the test for 2-year-olds than for 3-year-olds.

Table 10. Median Percentages of Difficulty for English-Speaking Ghanaian and U.S. Samples

Sample	Median Item Difficulty	
	English Sample	U.S. Sample
Total Sample	45%	48%
2-year-olds	31.5%	30%
3-year-olds	64%	63%

Results of the median item difficulty for the total sample and for each age group for the Twi-speaking sample and the original CAS-2 data appear in Table 11. The data show results for the total sample and each age group of the Twi-speaking sample were similar to results for the CAS-2 U.S. norm sample. As expected, for both the Twi-speaking-Ghanaian sample and U.S. norm sample there were more difficult items on the test for 2-year-olds than for 3-year-olds.

Table 11. Median Percentages of Difficulty for the Twi-Speaking Ghanaian and U.S. Samples

Sample	Median Item Difficulty	
	Twi Sample	U.S. Sample
Total Sample	46.3%	48%
2-year-olds	31.5%	30%
3-year-olds	64%	63%

Tables 12 describes the percentages of children who passed each test item for the overall group of Ghanaian children taking the CAS-2 in English and the CAS-2 U.S. norm sample. Data for the U.S. sample were provided by the test authors. Of the 88 test items, item difficulty was within the acceptable range of 15 to 85% for 50 items for the English-speaking-Ghanaian sample. Nineteen questions had item difficulties above 85% indicating they were very easy for the participants; 19 questions yielded item difficulties below 15% indicating they were very difficult for these children.

Table 12. Item Difficulty Percentages for Total English-Speaking Sample

Item	English-Speaking Sample	U.S. Sample	Item	English-Speaking Sample	U.S. Sample
OL1	91	99	R15	27	18
OL2	9	69	R16	5	7
OL3	77	74	M1	55	98

OL = Oral Language  
H = Handwriting  
M = Math  
EB = Enabling Behaviors  
R = Reading

Table 12. Item Difficulty Percentages for Total English-Speaking Sample  
(Continued)

Item	English-Speaking Sample	U.S. Sample	Item	English-Speaking Sample	U.S. Sample
OL4	68	95	M2	59	80
OL5	63	80	M3	55	80
OL6	68	91	M4	36	70
OL7	23	58	M5	45	62
OL8	95	64	M6	32	58
OL9	82	79	M7	32	55
OL10	14	40	M8	23	42
OL11	95	93	M9	32	29
OL12	82	93	M10	18	31
OL13	91	88	M11	14	40
OL14	64	80	M12	23	53
OL15	73	90	M13	73	48
OL16	45	74	M14	36	47
OL17	73	81	M15	32	43
OL18	100	65	M16	27	27
OL19	95	85	M17	55	16
OL20	91	68	M18	27	23

OL = Oral Language  
H = Handwriting  
M = Math  
EB = Enabling Behaviors  
R = Reading

Table 12. Item Difficulty Percentages for Total English-Speaking Sample  
(Continued)

Item	English-Speaking Sample	U.S. Sample	Item	English-Speaking Sample	U.S. Sample
OL21	82	53	M19	9	15
OL22	77	13	M20	5	15
OL23	32	8	M21	9	15
OL24	36	14	M22	9	13
OL25	36	75	H1	100	94
OL26	9	74	H2	82	20
OL27	45	75	H3	91	25
OL28	18	75	H4	82	26
OL29	9	65	H5	95	17
OL30	9	20	H6	72	0
R1	45	78	EB1	100	94
R2	82	91	EB2	100	93
R3	18	83	EB3	95	90
R4	27	50	EB4	95	90
R5	0	41	EB5	91	89
R6	41	33	EB6	95	87

OL = Oral Language  
H = Handwriting

M = Math  
EB = Enabling Behaviors

R = Reading

Table 12. Item Difficulty Percentages for Total English-Speaking Sample  
(Continued)

Item	English-Speaking Sample	U.S. Sample	Item	English-Speaking Sample	U.S. Sample
R7	9	18	EB7	91	80
R8	0	8	EB8	91	71
R9	5	20	EB9	77	63
R10	5	6	EB10	77	54
R11	14	14	EB11	73	47
R12	5	4	EB2	50	24
R13	18	15	EB13	32	22
R14	5	3	EB14	91	63

OL = Oral Language  
H = Handwriting

M = Math  
EB = Enabling Behaviors

R = Reading

Tables 13 describes the percentages of children who passed each test item for the overall sample of Ghanaian children taking the CAS-2: Twi and the U.S. norm sample for the CAS-2. Of the 88 test questions, item difficulty was within the acceptable range of 15 to 85% for 38 questions for the Twi-speaking Ghanaian sample. Thirty eight were either very easy or very difficult, yielding percentages below 15% and above 85%. Twenty two questions had item difficulties above 85% indicating that they were very easy for the participants; 28 questions yielded item difficulties below 15% indicating they were very hard for the participants.

Table 13. Item Difficulty Percentages for the Entire Twi Speaking Sample

Item	Twi Sample	U.S. Sample	Item	Twi Sample	U.S. Sample
OL1	96	99	R15	4	18
OL2	30	69	R16	4	7
OL3	90	74	M1	96	98
OL4	91	95	M2	74	80
OL5	100	80	M3	65	80
OL6	74	91	M4	65	70
OL7	13	58	M5	74	62
OL8	96	64	M6	26	58
OL9	74	79	M7	26	55
OL10	39	40	M8	39	42
OL11	100	93	M9	74	29
OL12	83	93	M10	74	31
OL13	91	88	M11	4	40
OL14	61	80	M12	0	53
OL15	30	90	M13	57	48
OL16	43	74	M14	43	47
OL17	91	81	M15	17	43
OL18	100	65	M16	4	27

OL = Oral Language  
H = Handwriting

M = Math  
EB = Enabling Behaviors

R= Reading

Table 13. Item Difficulty Percentages for the Twi Entire Sample (Continued)

Item	Twi Sample	U.S. Sample	Item	Twi Sample	U.S. Sample
O19	48	85	M17	22	16
OL20	83	68	M18	0	23
OL21	87	53	M19	0	15
OL22	83	13	M20	0	15
OL23	4	8	M21	0	15
OL24	4	14	M22	0	13
OL25	35	75	H1	83	94
OL26	0	74	H2	57	20
OL27	30	75	H3	91	25
OL28	26	75	H4	91	26
OL29	0	65	H5	39	17
OL30	0	20	H6	39	0
R1	52	78	EB1	100	94
R2	65	91	EB2	100	93
R3	39	83	EB3	100	90
R4	9	50	EB4	100	90
R5	0	41	EB5	100	89
R6	9	33	EB6	100	87
R7	4	18	EB7	91	80
R8	0	8	EB8	91	71

OL = Oral Language

M = Math

R= Reading

H = Handwriting

EB = Enabling Behaviors

Table 13. Item Difficulty Percentages for the Twi Entire Sample (Continued)

Item	Twi Sample	U.S. Sample	Item	Twi Sample	U.S. Sample
R9	0	20	EB9	57	63
R10	0	6	EB10	26	54
R11	0	14	EB11	26	47
R12	0	4	EB12	26	24
R13	0	15	EB13	13	22
R14	4	3	EB14	100	63

OL = Oral Language                      M = Math                      R = Reading  
H = Handwriting                      EB = Enabling Behaviors

Table 14 compares the number of the very-easy and very-difficult items in each section of the CAS-2 across the three groups of children. For the Oral Language section the percentage of very easy items was highest for Twi speaking children. Percentages for English-speaking-Ghanaian children and children from the U.S. were similar. The percentages of very-difficult Oral Language items also were similar for English-speaking Ghanaian children and those from the U.S., whereas the Twi-speaking children found more Oral Language items very difficult than the other two groups.

The percentages of very-easy-Reading items was similar across the three groups with few items being very easy (range 0- 6%). Percentages of very-difficult Reading items were the highest of any CAS-2 section, with results for both groups of Ghanaian children being higher than for U.S. children.

Percentages of very-easy-Math items were similar across the three groups; few items were very easy (range 0-5 %). U.S. children found few Math items very difficult, whereas the

Two-speaking children had the highest percentage of items that were very difficult (36%) for them and 23% of the items were very difficult for English-speaking-Ghanaian children.

The percentage of very-easy Handwriting items was similar across the three groups (range 17-50%). No Handwriting items were found to be very difficult for any of the three groups of children.

Both groups of Ghanaian children found 64% of items for the Enabling Behaviors section very easy, whereas only 43% of U.S. children did. Few items were very difficult for any of the groups of children (range 0-7%) for this section.

Table 14. Comparison of the Number of Very-Easy and Very-Difficult Items in each CAS-2 Section Across Groups

CAS-2 Section (Items/Section)	English- Speaking Ghanaian Children >.85	English- Speaking Ghanaian Children <.15	Two- Speaking Ghanaian Children >.85	Two- Speaking Ghanaian Children <.15	U.S. Children >.85	U.S. Children <.15
Oral Language (30)	7	4	10	6	6	3
Reading (16)	0	9	0	8	1	6
Math (22)	0	5	1	8	1	1

The point bi-serial index was used to evaluate item discrimination. Each item on the test was compared with the General Cognitive Quotient. Item discrimination refers to how well an item can differentiate between those who are doing well on the overall test and those who are

not. Anastasi and Urbina (1997) suggested the minimum correlation for acceptable item discrimination indexes is .20. Tables 15 and 16 depict the median item discriminating powers for both Ghanaian groups of children for each age group. All correlations were above .20 for both the GCQ and NCQ. These results suggest items on the CAS-2: GH-English and CAS-2: Twi can differentiate among cognitive abilities of 2- and 3-year-olds.

Table 15. Median Discriminating Powers for CAS-2: GH-English

CAS-2: GH		Median Item Discrimination		
Values				
Type of	English-	U.S. sample:	English-	U.S. Sample:
Score	speaking	2-year-olds	speaking	3-year-olds
	sample:		sample:	
	2-year-olds		3-year-olds	
GCQ	.38	24-29 mos = .33;	.25	36-41 mos = .35;
NCQ	.26	30-35 mos = .33	.35	42-47 mos = .38

GCQ = General Cognitive Quotient; NCQ = Nonverbal Cognitive Quotient

Table 16. Median Discriminating Powers for CAS-2: GH-Twi

CAS-2: GH		Median Item Discrimination		
Values				
Type of	Twi-	U.S. sample:	Twi-	U.S. Sample:
Score	speaking	2-year-olds	speaking	3-year-olds
	sample:		sample:	
	2-year-olds		3-year-olds	
GCQ	.42	24-29 mos = .33;	.31	36-41 mos = .35;
NCQ	.35	30-35 mos = .33	.25	42-27 mos = .38

GCQ = General Cognitive Quotient; NCQ = Nonvocal Cognitive Quotient

## CHAPTER IV

### DISCUSSION

The need for reliable and valid methods of identifying psycho-educational difficulties in preschool children has been longstanding in Ghana. Currently, there are no preschool tests for Ghanaian preschoolers. Therefore, the purpose of this study was to translate and adapt the Cognitive Abilities Scale-Second Ed. (CAS-2; Bradley-Johnson & Johnson, 2001) Preschool Form so it would be appropriate for Ghanaian children. In addition the reliability, item difficulty, and item discrimination were examined for this translation and adaptation.

The CAS-2 was selected for this study because the CAS-2 test results correlate highly with both intelligence and achievement measures and support for the educational usefulness of each item is provided in the examiner's manual. Thus, this test can provide an assessment of cognitive ability as well as information relevant to instructional planning.

Additionally, consistent with the criteria suggested by Bracken and Barona (1991), Keston and Jimenez (1954) and Knapp (1960) for test translations and adaptations; the CAS-2 has several characteristics that would provide a sound translation. For example, it has good technical adequacy, assesses both receptive and expressive skills, and does not have timed items.

The sample of 45 Ghanaian children ranged from 24 to 47 months. Twenty –two children were English speaking and 23 spoke Twi. The children were from preschools in an urban-middle-income-area of Accra and an urban-low-income area of Koforidua. Accra is the capital of Ghana, and children who live there are likely to have greater access to preschools and quality education. Children from Koforidua were chosen because they were likely to be native Twi speakers. All were typically developing except one suspected of having a developmental disability.

The wording of items for the CAS-2 version for English-speaking-Ghanaian children did not require translation, but a number of items required adaptation to make them more appropriate for the Ghanaian culture. The adaptation appeared to work well in terms of overall norm-referenced results for English-speaking-Ghanaian children. Their mean scores were not significantly different from the CAS-2 results for the U.S. norm sample for either the General Cognitive Quotient (GCQ) (95 and 99 respectively) or Nonvocal Cognitive Quotient (NCQ) (94 and 100 respectively). Whether speech was required was not a factor in the overall performance of these children. However, results were somewhat more variable when the children were required to speak (GCQ  $SD = 13$ ) than when only nonverbal responses were required (NCQ  $SD = 10$ ).

Both translation and adaptation were required for the CAS-2:GH-Twi version. The GCQ and NCQ for Twi-speaking-Ghanaian children were significantly lower than results for the English-speaking-Ghanaian-children. The lower results for these children could be a result of several factors. Perhaps further work is needed on the translation to make it more appropriate for those who speak Twi, the quality of educational services these children receive may be less than that provided for their English-speaking peers and children in the U.S., the testing conditions for some of these children were less than optimal (e.g., the headmaster's presence when testing some children, and other children gathering around children tested during lunch time), or they may reflect the actual performance of the children who spoke Twi. These differences could be a result of any combination or all of these factors.

Additionally, for Twi-speaking-Ghanaian-children their GCQ of 79 was significantly lower than their NCQ of 88. Thus, these children performed better when they did not have to speak to answer questions than when speech was required. Among the Twi-speaking children,

the variability in scores was about the same regardless of whether the children used speech (GCQ  $SD = 12$ ) or nonverbal responses to indicate their answers (NCQ  $SD = 11$ ).

Correlations for internal consistency for the GCQ for all three groups of children were .90 or higher, thus, items appear to be quite homogeneous for this result in terms of what is assessed. Although the NCQ for the U.S. sample was .90, for both groups of Ghanaian children the NCQ correlation was .82, below the minimum acceptable for internal consistency reliability. Thus, for both the English-speaking-Ghanaian children and Twi-speaking-Ghanaian children the NCQ items appear to be more heterogeneous in terms of what is assessed than the combination of CAS-2 GCQ items, some of which require speech. In other words, the combination of items for the GCQ appears to provide more consistency in what is assessed across items for these children than use of the smaller sample of NCQ items which do not require speech.

For all three groups of children the standard errors of measurement (SEm) for both the GCQ and NCQ were similar to the SEm found in other cognitive tests for young children. SEms ranged from 3 to 5.

Test-retest reliability describes the stability of performance on a test over time (Sattler, 2008). The GCQ and NVQ for both age levels in both Ghanaian samples of children produced high levels of consistency over a 13 day period. The correlations ranged from .97 to .98, all above the minimum of .90 for acceptable reliability. These findings indicate that both versions of the CAS-2: GH have good short-term stability for English speaking and Twi speaking children, similar to that found for the CAS-2 for American children.

Inter-examiner reliability describes the extent to which different examiners agree in scoring a test (Sattler, 2008). For both samples of Ghanaian children, both the GCQ and NCQ, correlations ranged from .97 to .98, above the minimum of .90.

Item difficulty results describe the proportion of students who pass each item. This information is useful in selecting items for a test that will aid in discriminating among children of various skill levels. Brown, Wiederholt, and Hammill (2009) suggested the range from 15% to 85% as appropriate for selecting most items. Items with item difficulties above 85% are very easy whereas items with difficulties below 15% are very hard. Ideally, tests should have some easy items to help build rapport and ease anxiety in test takers; items in the acceptable range to discriminate among ability levels of children, and very difficult items to identify children with advanced skill levels. Especially with very young children, having several very easy items throughout a test is important to address developmental issues such as limited attention span and lack of understanding of the importance of giving their best performance. The CAS-2:GH English and CAS-2: Twi both had items with difficulty levels in the very easy, the acceptable and the very hard levels. Item difficulty for the three groups of children is described below along with suggestions as to why some items had difficulties less than 15% or greater than 85%.

The first 10 items of the Oral Language section assess understanding of position words. The item *in* was very easy for all three groups of children. The item *next to* also was very easy for both groups of Ghanaian children, but was in the acceptable range for U.S. children. Items *together* and *top*, were very easy for Twi speaking children but within the acceptable range for both the English-speaking-Ghanaian children and U.S. children. Perhaps these concepts receive greater emphasis at this age among Twi speaking children than English speaking children. The item *up* was very easy for both Twi speaking and U.S. children but was in the acceptable range for English-speaking-Ghanaian children. The item *down* was in the acceptable range for both groups of Ghanaian children but was very easy for U.S. children. Items *under* and *in front of* were very difficult for English-speaking Ghanaian children, but were in the acceptable range for

both the Twi speaking children and U.S. children. The concept *under* may be harder for these children because under is synonymous to bottom (i.e., lowest point) in many Ghanaian languages. All of these children were bilingual and thus, the concept *under* may have been confusing to them. If so, this item may need revision. The concept *in front of* may have been difficult for these children because they were not being vigilant. Most children who missed this item put the coin behind rather than in front of the car. Thus using a toy car more similar to those in Ghana, and one with a distinct front and back, may provide a more accurate assessment of the concept *in front of* for these children. The item *around* was very difficult for Twi-speaking children but acceptable for both the English-speaking Ghanaian children and U.S. children. For the position items, some Twi speaking children were not given the opportunity to provide answers in English. The Twi speaking children may have been able to understand the concept of *around* if they had been given the opportunity to provide answers in English. The remaining position concept (*away from*) was within the acceptable range for difficulty for all three groups of children. For Twi-speaking children, these 10 position concepts seemed easier than for English-speaking children. Perhaps this is because these words are used frequently in the daily routines of the Twi speaking population. One way Ghanaian children are exposed to position words is through the use of these words when they are given chores to do. Children from impoverished areas often begin performing chores at a much younger age, as well as with a higher frequency, than in higher income areas. As such Twi speaking children may have had more exposure to these concepts than the English speaking children through the tasks they were given.

Interestingly, according to the 3 classroom teachers interviewed, these 10 concepts seemed inappropriate for children below age 3 because these concepts are not taught until

children move to classrooms for 3-year-olds. However, 8 of the 10 position concepts were at the very easy or acceptable levels for the English-speaking Ghanaian children and 9 of the 10 position words were either very easy or within the acceptable range for Twi-speaking children. The differences in teacher perception about the age at which these children are exposed to these concepts and the age at which the children actually demonstrate understanding of these concepts are likely a result of children being exposed to these concepts in environments other than the classroom.

The next 10 Oral Language items assessed identification of nouns. For all three groups of children the nouns *bicycle* and *bird* were very easy. The items *apple* and *glasses* were very easy for U.S. children and within the acceptable range for both groups of Ghanaian children. A number of Ghanaian children identified the picture of the red apple as a tomato suggesting that modification of the picture would make this item easier for these children. Based on the examiner's experience with both cultures, sun glasses seemed to be more commonly used in the U.S than in Ghana, thus they may be more familiar to U.S children. The item *car* was very easy for both groups of Ghanaian children but was in the acceptable range for U.S. children. *Car* may have been easier for Ghanaian children because it replaced the original CAS-2 item *wagon*. This substitution was used because a *wagon* is rare in Ghana and so would have been an unfair item for these children. The substitution of *car* for *wagon*, may have made this item very easy because cars are common item in Ghana and they are pictured in many preschool materials. The item difficulty for *cow*, *axe*, *duck*, *sock* and *butterfly* fell within the acceptable range for Twi-speaking Ghanaian-children and U.S children, although *sock* and *butterfly* were very easy for the English-speaking-Ghanaian-children. The noun *hammer* was changed to *axe*, to make it more culturally appropriate in Ghana. Perhaps this change may have made this item easier for

English-speaking-Ghanaian children as the concept *hammer* was for U.S. children. For the item *sock*, the picture was adapted to make it more familiar for Ghanaian children. Specifically, the picture of the colored sock was changed to a white sock. School regulations in Ghana typically require school aged children to wear white socks. This adaptation may have made this item somewhat easier for Ghanaian children. The item *butterfly* replaced the original CAS-2 *lady bug*. Although some species of lady bugs may exist in Ghana they are relatively uncommon. The replacement of *lady bug* with *butterfly* may have made this item relatively easier for Ghanaian children.

According to the 3 classroom teachers interviewed, items assessing *bicycle*, *cow*, *glasses* and *socks* are inappropriate for 2- and 3-year-olds because these items are not taught in preschool. These perceptions are contrary to the findings of the study suggesting the children had been exposed to these items through other sources.

Four items on the Oral Language section assess knowledge of pronouns. For both groups of Ghanaian children the items *you* and *I* were in the acceptable range of difficulty. Among the U.S children, the item *you* was in the acceptable range but *I* was very hard. Why the concept *I* was difficult for U.S. children is unclear. The remaining pronouns (*she* and *him*) were easy for the English-speaking Ghanaian-children but were hard for the Twi speaking children and the U.S children. The difference in item difficulty between the Twi speaking children and English speaking children on the pronouns *she* and *him* may be due to difficulty in understanding directions. Among the Twi speaking sample children found it difficult to transition from the item assessing *I* to items assessing *she* and *him*. They appeared to think the cups still belonged to them and to the examiner. They seemed to transition better when the examiner introduced the

additional instruction, “The cups are not for us anymore.” These test directions may need to be modified for Twi speaking children.

Six Oral Language items assessed knowledge of syntax. Item difficulties for using a noun-verb combination, verb with *ing*, and a possessive were acceptable for all three groups of preschoolers. Items assessing use of plurals, an article (e.g., *a*, *an*) and reporting information in a correct sequence were very difficult for both groups of Ghanaian children, but in the acceptable range for U.S children. These items may have been harder for Ghanaian children because these skills are not taught until kindergarten. Also, articles are not used in the Twi language, so this item may be inappropriate for these children.

Although the 3 teachers interviewed indicated syntax is not taught for 2- and 3-year-old preschoolers, results indicate that use of noun-verb combinations, verbs with *ing*, and possessives may be appropriate for 2 and 3-year-old Ghanaian children.

The first two reading items tap book handling skills. All three groups of children turned the book right side up. U.S. children found turning pages one-at-a-time very easy and item difficulty for this item was acceptable for both groups of Ghanaian children. Item difficulty for pointing to pictures in a book named by the examiner was in the acceptable range, using noun-verb combinations to describe pictures and naming the letter A both had an acceptable difficulty level for English-speaking-Ghanaian and U.S. children, but were very difficult for those who spoke Twi. All three groups found remembering something from a short story very difficult. The remaining 10 items tapped either naming or giving the sound for letters. All of these items were very difficult for all three groups of children, except that giving the sounds for *F* and *C* were in the acceptable range for English-speaking-Ghanaian-children and those from the U.S. Although all three groups of children found many reading items very difficult, the children who

spoke Twi had the most difficulty. Based on the examiner's experience in preschools in the U.S. and Ghana, it seems U.S. children are exposed more to reading activities and have more reading materials available than both English-speaking and Twi-speaking Ghanaian children. However, the English-speaking-Ghanaian children have greater access to these materials and activities than Twi-speaking-Ghanaian children.

The perception of the 3 teachers' interviewed indicated these skills are typically taught in preschool, yet all three groups of children found naming letters and giving their sounds very difficult. All three groups did find book handling skills and pointing to pictures in books to be in the very easy or acceptable range.

The first 10 items of the mathematics section tap understanding of mathematical concepts such as *all*, *same*, *more*, *fewer*, *full*, and *empty*. These concepts were within the acceptable range for all three groups of children except for the concept *big* which was very easy for the Twi speaking children and children from the U.S.

The remaining items on the mathematics section tap various counting skills and matching quantities. For all 3 groups imitation of counting, building with blocks and matching pictured quantities were in the acceptable range of difficulty. Both groups of Ghanaian children found the the following items very difficult: concept of *different*, holding up fingers to show their age, counting out quantities and matching quantities with numbers. These tasks were in the acceptable range for U.S. children, except one matching item that was very difficult. It may be that these skills are emphasized earlier in the U.S. than in Ghana.

Three teachers felt assessing the concepts of *full*, *empty*, *same*, *different*, *few*, *more* as well as the cardinality principle were inappropriate for children below 3 because these children would not have been taught these concepts yet.

Six items measured writing skills including the child's posture, pencil grip and drawing/imitation skills. An upright writing posture was very easy for English-speaking-Ghanaian-children and those from the U.S. and was in the acceptable range for those who spoke Twi. Using fingers to grasp the pencil fell in the acceptable range for all three groups of children. Items assessing the ability to draw a circle and a horizontal line were very easy for English-speaking-Ghanaian-children; a vertical line was in the acceptable range of difficulty. Whereas for children who spoke Twi, copying a circle and a vertical line was very easy but copying a horizontal line fell in the acceptable range. All 3 of these items were in the acceptable range of difficulty for U.S. children. The item assessing the ability to draw a plus sign was within the acceptable range of difficulty for both groups of Ghanaian children but was very difficult for U.S. children. The handwriting items were easy for Ghanaian children, perhaps because imitation is a large component of teaching in Ghana and children are able to imitate actions, even those actions they do not necessarily understand. Also, the 3 teachers interviewed identified these items as appropriate for 2- and 3-year-olds in preschool.

The first 3 items on the Enabling Behaviors section tap willingness to imitate vocally and the next three tap willingness to imitate physical gestures. These 6 items were all very easy for all three groups of children. The next 7 items assess ability to imitate sentences that gradually increase in length. For both groups of Ghanaian children imitating sentences up to 4 words in length was very easy, whereas sentences of 5 to 8 words were in the acceptable difficulty range. Nine word sentences were in the acceptable range for those who spoke English and were very difficult for those who spoke Twi. Although the words used for this item were adapted for those who spoke Twi, the difference in item difficulty may be due to the variance in sentence structure and grammar between the English and Twi languages, perhaps making this item more difficult

for this sample. For U.S. children all sentence imitation items fell in the acceptable range. As stated previously, rote memorization is highly emphasized in the Ghanaian education system; perhaps making items requiring imitation generally easier for Ghanaian children.

Item difficulty for the Oral Language section was similar for the CAS-2 English and the original CAS-2. However, for the CAS-2: Twi the Oral Language section had more items that were too easy and more that were too difficult than for the other groups. To enhance appropriateness of items on this version, as well as the ability of this version to discriminate among these children with various levels of functioning, further modification of some items that were very easy or very difficult in this section so that they fall in the appropriate difficulty range may be beneficial. Also for this version of the test, further modification of items that were too difficult on the Reading and Math sections for these children may be helpful.

The item discriminations of both the CAS-2: English and CAS-2: Twi indicates items on both tests can differentiate between those who are doing well on the overall test and those who are not. This because for both the CAS-2: English and CAS-2: Twi, the correlations on both tests exceeded Anastasi and Urbana's suggestion of minimum acceptable indexes of .20.

#### Parent and Teacher Feedback

In addition to being norm-referenced, the CAS-2 is designed to provide information for instructional planning. Therefore summary reports were given to parents describing skills their children demonstrated and skills that would be appropriate to teach their children next. For parents who were not proficient in English, explanations and recommendations were provided verbally in Twi. The parents of the Twi speaking children indicated they found the information provided useful. The examiner could not provide the summary reports immediately to the

parents of the English speaking children. However, feedback from school administrators indicated these parents found the test results useful. Thus, providing such information to parents may assist them in providing appropriate instruction for their children.

Overall the 3 teachers interviewed reported that although the CAS: 2-English was useful in determining cognitive abilities as well as what skills to teach next, some items may not be useful because they are not taught until children reach kindergarten. Additionally, the teachers suggested that the items were more suitable for 3-year-olds than 2-year-olds because 3-year-olds were more likely to be exposed to more of the items on the test. The teachers also suggested that some of the test materials may not be appropriate for the Ghanaian population, particularly those from impoverished backgrounds because they may not be familiar to children from those backgrounds. Examples of materials they thought might be unfamiliar to Twi speaking children were: nesting cups, the ramp, and the dolls. Thus, replacing these items with more familiar items might be beneficial.

#### Limitations to this Study

The sample size was small and had a restricted range for both the English-speaking and that Twi-speaking samples, thus, limiting the generalization of these results. The limited sample size may have been due to parents being wary of participating in studies without first meeting the researcher in person. Ghanaians value in-person contacts and are less likely to enroll in studies without first meeting the researchers in person. Also, because I am a doctoral student in the U.S. and the study was run in Ghana, I had only a limited amount of time I could spend recruiting participants and gathering data.

Secondly, the samples were convenience samples as such the results of the study may not generalize to the all English-speaking and Twi-speaking children of Ghana. Within the English speaking population, there is considerable diversity with regard to income, educational background of parents, quality of preschool education, as well as different language and cultural factors. The English speaking sample was recruited from Accra, an urban area. Although, the information regarding social economic status of the parents could not be obtained, the preschools involved in the study were located in middle class neighborhoods. The parents may have been highly educated compared to the rest of the Ghanaian sample. Schady (2011) conducted a study with children from low income backgrounds from rural Ecuador. Results indicated that maternal education is a good determinant of cognitive development in young children. The parents of these children may also come from a high economic status compared to the general Ghanaian population and so can afford better quality preschools. The English-speaking sample was not a nationally representative sample with regard to income and parental education, limiting the generalizability of these data.

Within the Twi- speaking population, although the children were recruited from a Twi speaking area, there was diversity with regard to the type of Twi dialect spoken by these children. This is because there are several dialects of Twi; consequently some of the items may have been unfamiliar to native Twi speakers depending on the children's dialect. This issue could have been addressed by including a review of the study by a bilingual committee. However, due to time constraints and insufficient resources, a bilingual committee review was not possible. Furthermore, the Twi speaking sample was recruited from a relatively low income area. Therefore, the parent education and quality of education may not be representative of the entire Twi speaking population for Ghana.

Thirdly, the samples consisted only of English speaking and Twi speaking children. Ghana has 9 written languages and 73 living, indigenous languages. Thus, the results may not apply to other subgroups of Ghanaian children of different linguistic backgrounds and ability levels.

There was a vast difference in the quality of testing conditions between the English speaking and Twi speaking samples. The data for the English speaking sample were collected in a quiet relaxed classroom. However, data for the Twi-speaking population were collected in the headmaster's office with the headmaster present and also in a noisy space with other children varying in ages observing the sessions. The noise as well as the anxiety of testing in front of a crowd may have negatively affected the performance of the Twi-speaking sample.

Thus, future efforts for adapting and translating tests would do well to have the resources in terms of time and financial support to follow all the guidelines suggested by Bracken and Barona(1991) including a bilingual committee review. In addition, using more extensive pilot testing for both the CAS-2-English and CAS-2-Twi, obtaining larger more representative samples, and using non-distracting testing environments for all children would be beneficial.

### Summary

The purpose of this study was to translate and adapt the CAS-2 for English-speaking and Twi-speaking Ghanaian children. Many results of the study were encouraging. The internal consistency for both forms was very good for the GCQ and the SEMs were within the typical range for tests for young children. Short-term stability results were very high as were results for inter-examiner reliability for both forms. Both versions of the CAS-2 had some very easy and some very difficult items as well as many items that fell within the acceptable range for  $\alpha$ . Item

discrimination results exceeded the minimum acceptable for both forms also. Results for English-speaking Ghanaian children fell within the average range for both the GCQ and NCQ.

Limitations of the results include a restricted range for both Ghanaian samples shown by standard deviations of less than 15 for 5 of the 6 standard deviations for each group. This is not unexpected when small convenience samples are used. Areas suggesting further consideration include the significantly lower scores for the Twi speaking children for both the GCQ and NCQ than for the English speaking group. These findings may reflect the actual skills of these children, may be a result of distracting testing conditions used for some of them, or may reflect some items that would benefit from further modification to ensure their appropriateness for children who speak Twi. No doubt the results for the children who spoke Twi result from a combination of these factors. Also, the internal consistency of the NCQ was low for both Ghanaian groups, suggesting more or different nonvocal items may be needed to improve NCQ results for these children. The item difficulty results suggest a number of items which might benefit from further modification.

## APPENDICES

APPENDIX A  
PRESCHOOL/DAYCARE ADMINISTRATORS'  
COVER LETTER AND CONSENT FORM

Date: Year, Month

Dear Preschool Administrator,

I am completing a research study as an initial step to develop and evaluate a Ghanaian version of the Cognitive Abilities Scale-Second Edition (CAS-2) which will be in English and Twi. Results will be used to evaluate the usefulness of the Ghanaian version of the test that may be helpful to assess skills of 2 and 3-year-old Ghanaian children. Without such tests, it is difficult to identify young children whose development is delayed and develop appropriate instruction. CAS-2 results help in planning instruction for children and predict future academic success.

Data from this study will appear in my dissertation, which will fulfill partial requirements for my degree, Doctor of Philosophy in School Psychology, at Central Michigan University.

Your help is requested in recruiting participants for this research. The following guidelines will be used to select participant selection: (a) children will be between the ages of 24 and 48 months, (b) have parents/caregivers willing to have their children tested with the Ghanaian version of the CAS-2.

For agreeing to allow their child to participate, parents will receive a written report describing the skills their child demonstrated and skills that would be helpful to practice next with the child.

For parents who have difficulty reading, the results will be verbally explained. No report will be given to the preschool, but parents may wish to share this report with preschool staff.

I will also ask you to circle any items on the test's record book that you think are inappropriate or too difficult for children in your program. This information will be used to evaluate the usefulness of the test.

Once I receive this form, I will provide you copies of cover letters and permission forms to give to parents. If you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the Institutional Review Board by calling 989-774-677, or addressing a letter to the Institutional Review Board, 251 Foust Hall Central Michigan University, Mt, Pleasant, MI 48859. If you have any questions or concerns please contact me at [mork1sp@cmich.edu](mailto:mork1sp@cmich.edu) or 0244603751 or you can contact my dissertation supervisor at Central Michigan University, Dr. Sharon Bradley-Johnson, at [johns1sb@cmich.edu](mailto:johns1sb@cmich.edu) or 001-989-854-2740.

I appreciate your time and consideration. I look forward to hearing from you and welcome the chance to work with you.

Sincerely,

Seraphim Mork,

Ph.D Candidate in School Psychology

Central Michigan University

Consent to Participate:

I, \_\_\_\_\_, agree to assist in the study being carried out by Seraphim Mork at Central Michigan University entitled, “A cognitive assessment for preschool aged children: Cognitive Ability Scale-Ghanaian Version”. I will help to recruit participants for the study by providing parents with information regarding the study.

\_\_\_\_\_

Signature of School Administrator

\_\_\_\_\_

Date

\_\_\_\_\_

Signature of Researcher

\_\_\_\_\_

Date

## APPENDIX B

### PARENT COVER LETTER

Date: Year, Month

Dear Parents,

I am a doctoral student in the School Psychology Program at Central Michigan University in Mount Pleasant, Michigan, United States of America, working under the supervision of Dr. Sharon Bradley-Johnson, a faculty member of Psychology Department at Central Michigan University. I am conducting a research project for my dissertation with 2-and 3-year-old children. The goal of my study is to develop a cognitive test for young Ghanaian children by adapting the Cognitive Abilities Scale-Second Edition (CAS-2). The Cognitive Abilities Scale-Second Edition (CAS-2) is an American test of cognitive abilities for young children. The test will be developed in both in English and Twi. Information from this test can be used to plan instruction for young children. Without such tests, it is difficult to provide appropriate instruction for some children.

Because your child is between 24 and 48 months old, your child is eligible to be part this study and I would appreciate your assistance. If you would be willing to help with this project, please read and sign the enclosed form and return it to your child's teacher. Your child's participation or non-participation in this study will not affect his/her daycare or preschool program.

If you agree to allow your child to participate, I will send you a summary report describing skills your child demonstrated on the test and skills that would be appropriate to practice next with him/her. Information collected will be kept confidential and results will not be given to the daycare/preschool program.

I would appreciate your help and hope you will be willing to allow your child to participate in my study. Thank you for your time and cooperation.

Sincerely,

Seraphim Mork

Ph.D Candidate in School Psychology

Central Michigan University

## APPENDIX C

### PARENT PERMISSION/CONSENT FORM

Title of Project: A Cognitive Assessment For Preschool Aged Children: Cognitive Ability Scale-Ghanaian Version

Investigators: Seraphim Mork & Dr. Sharon Bradley-Johnson

Phone: 0244603751 and 001-989-854-2740

Your son/daughter is invited to participate in a research project because he/she is between 24 and 47 months old. Information below will help you make an informed decision on whether or not to allow your child to participate. If you have any questions about the project, please ask.

The purpose of this project is to develop a Ghanaian version of an intelligence test, the Cognitive Abilities Scales-Second Edition (CAS-2) which is a test for children 2- and 3-years-old developed in United States. Considering the lack of intelligence tests for young children in Ghana, our goal is to assess the usefulness of this test for Ghanaian preschoolers.

If you agree to allow your child to participate in this study, you will be asked to bring your child to the daycare center/preschool that your child attends on the date arranged. I will administer the Ghanaian version of the CAS-2 to your child in his or her classroom. You are welcome to be present in the room with your child while he/she is being tested.

The test takes approximately 20-30 minutes, but the time may vary depending on your child's age and cooperation. Half of the children in the study will be retested 2 weeks later to determine if the results remain the same over time. The children to be retested will be selected randomly. You are welcome to be present in the room with your child while he/she is being retested.

You will receive a summary report describing the skills your child demonstrated and the skills that would be appropriate to practice next. This information will not be shared with the preschool staff and will only be shared with you.

Information from this study will appear in my written dissertation, which will fulfill the partial requirements for the degree, Doctor of Philosophy in School Psychology. Your participation will help us develop the Ghanaian version of an intelligence test for young children.

Parental responsibilities for this study will include:

- (1) Allowing me to give an intelligence test to your child. The test will take approximately 20-30 minutes to complete. You may be in the room with your child for the testing session.
- (2) Bringing your child to the daycare/preschool on the agreed upon day.
- (3) If your child was selected for retesting, allowing me to give an intelligence test to your child 2 weeks after the first testing session and bringing your child to the daycare/preschool on the scheduled day.

Any information obtained during this study that could identify you or your child will be kept strictly confidential. Background information about your child will be used only to describe the children in the project. The information may be published in scientific journals or presented at scientific meetings but the names of parents and children will be kept strictly confidential. Children will be given a code name to use for any records in the study and the key for the code will be kept in a locked cabinet and destroyed upon completion of the study. At any time during the study you may withdraw your child and all information collected on your child will be destroyed immediately.

Participation is voluntary. No known discomfort or risk is involved for children participating. Children typically enjoy the test materials. If any procedure for the study is changed, you will be informed and your consent obtained for the revised procedure.

If you agree to let your child participate, please complete and return the attached forms as soon as possible. You can return this form to your child's preschool teacher. You will be given a signed and dated copy of this form to keep. If you have any question about this study, please feel free to contact me via phone: 0244603751, or email: mork1sp@cmich.edu.

Or you may contact my supervisor:

Dr. Sharon Bradley Johnson  
Psychology Department, Sloan 232, Mt. Pleasant,  
Michigan 48858

001-989-854-2740

johns1sb@cmich.edu

If you are not satisfied with the way this study is being conducted, you may report (anonymously if you so choose) any complaints to the Institutional Review Board by calling 001989774677, or addressing a letter to the Institutional Review Board, 251 Foust Hall Central Michigan University, Mt, Pleasant, MI 48859.

Thank you very much for your help with this project.

Consent to Participate:

I understand the purpose of the study and issues around consent. I have read the above information and agree to participate in this study and allow my child to participate. I have received a copy of this consent form for my own records.

Name of Parent(s) or Guardian: \_\_\_\_\_

Date: \_\_\_\_\_

Phone Number of Parent(s) or Guardian: \_\_\_\_\_

Address of Parent(s) or Guardian: \_\_\_\_\_

Signature of Parent(s) or Guardian: \_\_\_\_\_

Child's Name: \_\_\_\_\_

Birth Date: \_\_\_\_\_

Examiner's Name: \_\_\_\_\_

Examiner's Qualifications: \_\_\_\_\_

In my judgment, the parent is voluntarily and knowingly giving informed consent to participate in this research study.

Name of Researcher:

Date:

\_\_\_\_\_

\_\_\_\_\_

Signature of the Researcher:

Date:

\_\_\_\_\_

\_\_\_\_\_

APPENDIX D

BACKGROUND INFORMATION FORM

Child's date of birth: \_\_\_\_\_ Child's age: \_\_\_\_\_

Parent who is completing the form: Mother: \_\_\_\_\_ Father: \_\_\_\_\_

Child's gender: Girl \_\_\_\_\_ Boy \_\_\_\_\_

Child's race/ethnicity: Ghanaian \_\_\_\_\_ Other \_\_\_\_\_

Does your child speak English? Yes \_\_\_\_\_ No \_\_\_\_\_

Does your child speak Twi? Yes \_\_\_\_\_ No \_\_\_\_\_

Mother's race/ethnicity: \_\_\_\_\_ Father's race/ethnicity: \_\_\_\_\_

Ghanaian \_\_\_\_\_ Ghanaian \_\_\_\_\_

Other \_\_\_\_\_ Other \_\_\_\_\_

Mother's education: \_\_\_\_\_ Father's education: \_\_\_\_\_

Less than high school \_\_\_\_\_ Less than high school \_\_\_\_\_

High school graduate \_\_\_\_\_ High school graduate \_\_\_\_\_

2-year college graduate \_\_\_\_\_ 2-year college graduate \_\_\_\_\_

4-year college graduate \_\_\_\_\_ 4-year college graduate \_\_\_\_\_

Masters/Ph.D \_\_\_\_\_ Masters/Ph.D \_\_\_\_\_

Does the mother speak English? Yes \_\_\_ No \_\_\_

Does the father speak English? Yes \_\_\_ No \_\_\_

Does the mother speak Twi? Yes \_\_\_ No \_\_\_

Does the father speak Twi? Yes \_\_\_ No \_\_\_

What language is primarily spoken at home?

Address: \_\_\_\_\_

Phone number where you can be reached (please include area code):

\_\_\_\_\_

Best time to call: \_\_\_\_\_

APPENDIX E

CAS-2: GH-ENGLISH

CAS -2 \_\_\_\_\_ Profile/Examiner gives book  
 Part two (2) of mental abilities and analysis. Early childhood education forms from 24-47 months.

Part 1. Direction

Child's name \_\_\_\_\_ Girl  Boy

Date of exams \_\_\_\_\_ Examiner's name \_\_\_\_\_

Date of birth \_\_\_\_\_ Examiner's Qualification \_\_\_\_\_

Order of years \_\_\_\_\_ Name of parents \_\_\_\_\_

Years in months \_\_\_\_\_ School or hospital \_\_\_\_\_

---

Part 2. Records of marks

---

	Raw Score	100 %	Age Equivalent	Quotient	SEM Interval	Confidence Range	Quotient
(GCQ)	_____	_____	_____	_____	_____	_____	_____
NCQ	_____	_____	_____	_____	_____	_____	_____

Data of new exams

	Name	Date	Standard marks	CAS-2 Equivalent
1.	_____			
2.	_____			

Note: Administer each section from the beginning to the end.

---

Part 1. Language

---

Instructions from 1-10

Preposition: you can emphasize if necessary.

1. Put the box (right facing up) and the coin on the table. Point to the coin. Say, “**this is the coin. Put the coin in the box.**” Award a mark if the coin is in the box. (24m)
2. Invert the box on the table and give the coin to the child. Say, “**Put the coin under the box.**” Award a mark if the coin is under the box. (36m)
3. Put two boxes, four inches apart on the table. Say, “**Push the boxes together**”. Award a mark if the boxes are together or if the child pushes the boxes at once (37m)
4. Place the inverted box and the slit on the table. Place lip on the bridge on the slit. Give the child a car. Say, “**let the car move up the bridge.**” Point to the bridge. Award marks if it moves over the bridge. (24m)
5. Leave the car on the box. Say, “**touch the top of the car with your hand.**” Award marks if he touches the top of the car with his hand. (30m)
6. Say, “**let the car go down the ramp**”. Award marks if the car goes under the ramp. (24m)
7. Place a box and car before the child. Say, “**let the car go around the box**”. Award marks if the car is able to go round the box. (39m)
8. With the box on the table, give the car to the child and say, “**move the car next to the box.**” Award marks if the moves closer to the box. (38m)
9. Bring the car close to the box. Say, “**take the car away from the box.**” Award marks if the car is taken from the box. (30m)
10. Place the car on the table. Give the coin to the child. Say, “**Place the coin in front of the car.**” Award marks if the is placed in front of the car. (47m)

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## Instructions 11-20

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Noun: Firstly, ask the child to name the pictures, and then ask the child to point to any picture they may have missed.

Instructions for naming: Present each item one at a time. Say, “what is this?” when the child wrongly mentions the name of something (example, fruit when you expect orange), say, “which of them?” Award two marks if the child names correctly the picture.

Instructions for pointing: Show three pictures (one picture test picture and two non-test pictures). Say, “show me \_\_\_\_ (the incorrectly named picture)”. Change the position of the three pictures after each test. Only ask the child to point to pictures incorrectly named. Test the child on every incorrectly named picture up to four times. If the child correctly shows you the picture three times, award a mark for that particular picture.

Note: The highest mark for each picture should be two. You can’t give a picture a mark of both two and one. Everything correctly named picture is worth two marks. Award one mark if the child identifies the picture three times. Award no mark if the child is not able to identify any of the pictures. If a child cannot speak, the child can only be award a mark of one or zero.

	Sheet	Mark
11.	Bicycle (24m)	bicycle, bicycle
12.	apple (24m)	apple (e.g. “fruit,” say, “which type?”)
13.	Bird (24m)	bird, chicken
14.	Cow (24m)	cow, moo cow
15.	Glasses (24m)	glasses, specs, spectacles
16.	Axe (26m)	axe (e.g. “tool” say “which type?”)
17.	Duck (26m)	duck
18.	Car (26m)	car
19.	Sock (26m)	sock
20.	Butterfly (26m)	butterfly

## Instructions 21-24

Pronoun: First, ask the child to provide the correct pronoun, if the child answers correctly, and then ask the child to name the pronouns for the rest of the items. If the child is not able to provide the pronouns, then ask the child to show you the correct answer. Don’t use signs to show the correct answer. Don’t change the instructions. If necessary, repeat the question once. You can award a maximum of two marks for each question. You can’t award a mark of both two and one for the same question. Award a mark of two is the child correctly uses a pronoun in the sentence, award mark of one if the child is able to show the correct answer, no mark if the child does not get the answer correct. If the child does not speak, he can only get a mark of one or zero.

21. (Speaking) Place a cup in front of the child. Place a cup in front of you .Say, “**one for you and one for me**”.point to your cup and say, “**whose cup is this?**”, if the child points, say, “**don’t point, tell me.**” Award two marks if the child is able to say “**you**” or “**your.**” (26m)

(Pointing) Say, “**where is your cup?**” Award one mark when the child points to his cup.

22. (Speaking) Point the cup of the child and say, “**who would be drinking water from the cup?**” If the child points, say “**don’t point, tell me.**” Award two marks when the child is able to say “**me**”. Don’t award a mark if the child says “**I**”. (25m)

(Pointing) Give the child the bottle. Say, “**please, I want some of water**”. Don’t change the words in the sentence because you are testing to see if the child understands the pronoun “**I**”. Award a mark if the child **pours the water into your cup**.

23. (Speaking) Place two dolls on the table. Give a cup to the female doll. Say, “**tell me which doll is holding the cup**”. If the child points, say “**don’t point, tell me which doll has the cup.**” Award two marks if the child is able to say “**she**”. Don’t award marks on “the doll”, “the girl” or “her”.

(Pointing) Give a spoon to the child. Say, “**She wants a spoon**”. Award a mark if the child is able to **give a spoon to the doll**.

24. (Speaking) Give the male doll a cup. Say, “**who did I give the cup to?**” If the child points, say “**don’t point, tell me**”. Award two marks if the child is able to say “**him**”. Don’t award marks on “the doll” or “the man” (32m)

(Pointing) Say, “**Please, give him some of the water**”. Award one mark when the child is able to **pour water for the male doll**.

Instructions 25-30

Syntax: Award a mark of only one or zero. Do not award a mark if the child does not speak.

25. Make sure the child joins the noun-verb combination (example, “father goes”). If you don’t observe this in the child’s speech, let the parent or teacher ask the child questions that will have the child produce two word combinations such as, “**what does your mother (or your father) do?**” Award a mark for **noun-verb combinations**. (33m)

26. Point to the two cups. Say, “**this is a cup**” and raise one cup, now raise both cups and say “**what are these?**” Award two marks for “**cups**”. The child is supposed to use plural form of cup. (37m)

27. Point to a picture of a boy running. Say, “**what is the boy doing?**” Award marks for “**running**”, “**walking**”, or **any related verb with -ing**. (34m)

28. Point to the parent’s or someone’s clothing, e.g., a person’s shoes? Say, “**Whose (shoe) is this?**” Award marks if the child is able to use possessive such as “father’s”. (32m)

29. Note if the child is able to use articles during the test (a, an, or the). Award mark for **the use of any article**. (34m)

30. Say, “**tell me what you do when you want to wash your hands?**”, if necessary say “**anything more?**” Award marks if the child is able to say **three things to do when washing**

**hands** (example “open the tap, put soap on hands, eat supper”). Sequence of presentation is important. (47m)

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## Part 2. Reading

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Marks: Award a mark of only one or zero.

1. Give the child the book; “Mikey’s Favorite Things”, turned upside down. Say, “**put it right so you can see.**” Award marks if the child turns the book properly. (26m)

2. Say, “**turn the page for me**”. Award marks if the child is able to **turn a page or several pages** (not the whole book) (26m)

3. Using pages 3 and 8 in “Mikey’s Favorite Things” book. Say, “**show me the bird. Show me the flowers in the pot**”. Repeat if necessary. Award marks if the child is able to **identify both pictures**. (25m)

4. Open to page 4 of “Mikey’s Favorite Things” book. Say, “**say something about the picture to me. What is going on here?**” Point to the picture. If he uses only one phrase, say to him, “**tell me more. What is going on here?**” Award a mark if the child is able to **use two noun-verbal phrases**. (41m)

5. Say, “**Listen, I am coming to tell you a story. Kofi’s dog run away from home. It left home for two weeks. Kofi was sad. He searched for it everywhere. One day, when Kofi was playing at on his compound, he saw dog coming. His dog had come home**”. Pause, say, “**tell me about the story. What happened?**” Award marks if the child is able to **provide an idea from the story**. (e.g., dog is home”). If the child is not listening when you telling the story, stop telling the story and give a mark of zero. (44m)

6. Write “A” on a sheet. Say, “**what letter is this?**” When the child is unable to name the letter, write the first letter of the child’s name. Say, “**what letter is this; what is its name?**” if the child’s name begins with A, make a B for the second letter. Repeat once when necessary. Award marks if the child names the either letter correctly. (47m)

Instructions 7-13

Show the sheet with letter M to the child. Say, “**this is letter M. It makes the sound “Mmm” as mouth, monkey, or milk.**” Emphasize “mmm” when saying the words. Now, show the pictures of the letters S, T, L, F, C. Show the child each picture one after the other and say to the child, “**what is the name of this letter?**” Wait as child answers. Now, say, “**what are the sounds of these letters? What do the letters say?**” Repeat once if necessary. Award one mark when the child is able to name the letters correctly. Award one mark when the child produces the letter sounds correctly.

7. Say S (47m)

8. Make S sound (47M)

9. Say T (47m)
10. Make T sound (47M)
11. Say L (47m)
12. Make L sound (47m)
13. Say F (47m)
14. Make F sound (47m)
15. Say C (47m)
16. Make C sound (47m)

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### Part 3. Mathematics

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Marks: Award a mark of only one or zero. For questions requiring an answer, award mark even if the child makes a mistake in his speech.

1. Place the four coins and a box on a table. Say, “**put all the coins in a box.**” Emphasize on ‘all’. Award a mark if the child **puts all the four coins in the box.** (24m)

#### Instructions 2-9

Test the child up to four times. Change the positions of the materials during each test. Provide feedback to the child after each last test. Award marks if the child is able to provide the correct answer three times.

2. Put a biggest nesting cup and smallest nesting cup together on a table. Say, “**show me the big cup**”. Award marks if the child is able to point to the big cup correctly three times. (32m)

3. Now say “**show me the little cup now.**” Emphasize on the “**now**” to see if the child will know instructions have changed. Award marks if the child is able to identify **the little cup three times.** (29m)

4. Pick a box containing 10 coins and an empty box on the table and say, “**which box is empty**”? Award marks if the child is able to identify the empty box three times. (38m)

5. Now say, “**now show me the box which is full**”. Emphasize “**now**” to see if the child will identify the instruction of the things that have changed. Award marks if the child is able to identify the full box three times. (39m)

6. Hold a long and short yellow pencil perpendicular to the table and place them on the table. Say, “**show me the long pencil.**” Award marks if the child is able to show you the long pencils three times. (43m)

7. Now say, “**now show me the short pencil.**” Emphasize on the “**now**” to see if the child will know the instructions have changed. Award marks if the child is able to show you the short pencil three times. (43m)

8. Place coins of five and two on a table. Say, “**which pile contains more coins?**” Award marks if the child is able to point out the pile containing the five coins three times. (44m)

9. Now say, “**now which pile contains the fewer coins?**” Emphasize on the “**now**” to see if the child is able to identify the change in instructions. Award marks if he is able to point the pile containing the two coins three times. (46m)

Instructions from 10-11

For all the tests say, “are all these pencils the same or different. To test the same, use two yellow pencils. To test different, use the yellow pencil and a different colored pencil. Award the child a mark if the child says “same” correctly three times. Award the child a mark if the child says “different” three times.

Test \_ same \_ different \_ different \_\_ same \_\_\_ same \_ different \_ same \_ different

10. Same (47m)

11. Different (47m)

12. Say “**how old are you? Show me your fingers.**” If the child only says the number, say, “**okay, now show me with your fingers**”. Award a mark if the child **shows his/her age with his/her fingers correctly**. Repeat once if needed. (44m)

13. Say “**one, two, three, four, five. Now count.**” Award marks when the child is able **to count to five**. Repeat once if necessary (43m)

14. Build a tower made out of the 4 cups. Point to the tower and say, “**look.**” Give all four cups to the child. Say, “**now you do it, make the tower.**” Award marks if the child is able to **build a tower with all four cups from the biggest to the smallest**. Repeat once if necessary. Repeat once if necessary (47m)

15. Place the picture strip of the fish on a table. Match the pictures of the fish with the picture strip of the fish and say, “**pick one fish goes with one fish, two fish goes with two fish, one fish goes with one fish, and two fish goes with two fish**”. Take the pictures, and mix them and give it to the child. Say, “**now you do it.**” Award marks if the child is **able to match the pictures correctly**. (46m)

16. Put a picture strip of the balls on a table and say, “**now do this one.**” Give the child pictures of the balls. Repeat if necessary. Award marks if the child is **able to match pictures correctly**. (46m)

17. Show a picture with the number 2 on it to the child. Say, “**what number is this?**” Now show the child another picture with 5 on it and say, “**what number is this?**” Award marks if the child is able to **identify both numbers correctly**. (47m)

18. Place four coins on the table in a row. Say, “**how many coins are there? Count**”. Wait for the child to answer. Remove two coins. Say, “**how many coins are there? Count.**” If the child does not touch the coins while counting say touch each one as you count. Award marks if **the child answers all the two correctly**. (46m)

19. Say, “**one, two, three. “Which number comes next?”**” Wait for the child to answer. Now say, “**two, three, four. Which number is next?”** Award marks **if the child is to answer both questions correctly**. Award marks even if the child says some numbers after saying the correct numbers.

20. Place 10 coins before the child. Say, “**give me four coins**” hold your hand out to the child. Wait for an answer. Put the coins back. Say, “**now give me three coins.**” hold your hand out to the child. Award marks if the child is able **to answer both questions correctly**. (47m)

Instructions 21-22

Place coins in groups of one, two, three and four randomly on the table. Award marks for **each correct match**.

21. Give the child a picture with number 2 on it say, “**pick the group of coins that goes with the picture.**” Take the picture away when the child is able to pick the group of coins correctly. (47m)

22. Give the child a picture with number 1 on it say, “**pick the group of coins that goes with the picture.**” Take the picture away when the child is able to pick the group of coins correctly. (47m)

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#### Part 4. Writing

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Marks: Questions 3-6 are on the writing symbol reproduction (from the pad in the kit). Scoring information is on the examiners’ manual on page 10. For questions 1 and 2 award marks of 0 or 1 regardless of whether or not the child can speak. For questions 3-6, award marks of 0, 1 and 2.

1. Look at the child’s sitting position when writing and give marks from question 3-6. Award one mark **if the child is able to sit erect and hold the sheet of paper with his/her nonwriting hands**. Award no mark if the child does not sit well or does not write. (24m)

2. Observe the child during question 3-6 to this answer question. Award one mark if the **child is able to hold the pencil with his/her fingers and not his/her fist**. Award no mark if the child does not hold the pencil with his/her fingers or does not write. (35m)

Instructions 3-6

Give the writing of symbol reproduction page to the child. Say, “**I want you to draw something for me. Draw this. Draw yours here.**” Show the child the symbol and where you want the child to draw it. Ensure that the child does it well. When the child is not able to draw the symbol correctly, say, “**watch me while I draw.**” Encourage child to watch you as you draw slowly. With vertical lines and horizontal lines say, “**zoom!**” as you draw. Say ‘**now you draw.**’ Award two marks if **the child is able to copy the symbol correctly from the picture**. Award one mark when the child is able to copy **from the examiner’s drawing**.

- |                                   |                          |                         |
|-----------------------------------|--------------------------|-------------------------|
| 3. Copies circle = 2 (42m)        | imitates circle = 1      | incorrect/no answer = 0 |
| 4. Copies vertical line = 2 (37m) | imitates vertical line=1 | incorrect/no answer=0   |
| 5. Copies long line=2 (42m)       | imitates long line =1    | incorrect/no answer=0   |
| 6. Copies plus sign = 2 (45m)     | imitates plus sign =1    | incorrect/no answer=0   |

Concerning teaching, note that the child sees the pencil one inch from its tip:

yes  no

## PART V. Enabling character

### Instructions 1-3

Verbal imitation: using the words “**flower**,” “**leaves**,” “**bouncy**,” and “**jumping**,” say to the child \_\_\_\_\_. Use the doll, flowers and ball to get your answer. Example, hit a ball against the table several times and say “**bouncy**”, put a doll on the table and make it jump, then say, “**jumping**” or use the flowers to get answers on “**flowers**” and “**leaves**” and show squeaky doll and get “critter.” Award one mark if the child is able **to repeat the words once**. Test the child up to three times on each word. The aim of testing is the child’s willingness to imitate rather than the correctness of the pronunciation. Award a mark if what the imitation **is a close approximation of the target word**.

- |  |   |   |   |
|--|---|---|---|
|  | 1 | 2 | 3 |
|--|---|---|---|
- a. flower
  - b. leaves
  - c. Bouncy
  - d. jumping

### Instructions 4-6

Physical imitation: Perform any of these behaviors. Pulling the ears, touching head, touching nose, touching neck and touching cheeks, say, “**look**.” Perform the behavior. Then say, “**now you do it**”. Award marks if the child to imitate the behavior. Test the child up to three times on each action. The aim of testing is the child’s willingness to imitate rather than the correctness of the action. Award a mark if what the imitation **is a close approximation of the target action**.

- |  |   |   |   |
|--|---|---|---|
|  | 4 | 5 | 6 |
|--|---|---|---|
9. ear
  10. nose
  11. head
  12. cheeks
  13. neck

### Instructions 7-13

Memory: Each question is made up of two sentences. If the child is able to repeat the first sentence correctly, award a mark for that and continue to the next question. Do not give the second sentence. If the child is not able to say the first sentence then you let the child repeat the

second sentence in the pair. Show enthusiasm when giving the words to the child. Discontinue if the child fails to repeat two questions (the pair of sentences). Ensure that the child is paying attention before saying the sentence. Award marks if the **child is able to say either pair of sentences for each question.**

7. a. say **“I like water.”** (32m)  
b. say **“that is mine.”**
8. a. say **“I want to draw.”** (35m)  
b. say **“the bird can fly.”**
9. a. say **“the fish can swim fast.”** (37m)  
b. say **“I like to play ball.”**
10. a. say **“I like to run and jump.”** (42m)  
b. say **“the cat likes to drink water.”**
11. a. say **“I like to draw in my book.”** (44m)  
b. say **“the fish can swim up and down.”**
12. a. say **“He went out to play with his friends.”** (47m)  
b. say **“She went for a walk down the road.”**
13. a. say **“She went to the shop to buy some bread.”** (47m)  
b. say **“The dog has black and white spots on him.”**

#### Instructions 14

Span: Tell the child to repeat the following words. Stop if the child makes a mistake. Award mark for each word sequence the child repeats. Administer both word sequences. Show enthusiasm when asking the child to repeat the words. Award marks for the longest word sequence repeated (Award marks for only one word sequence, not both Award a marks of zero, one, two, three and four.

Correct

14. List a. girl (24m)  
duck-sock (27m)  
cat-ball-cow (38m)  
bird-fish-tree-boy (47m)
- List b. cow (24m)  
girl-tree (27m)  
boy-bike-sock (38m)  
duck-fish-ball-bird (47m)

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Page eight	Totals
Page seven	Totals
Page six	Totals
Page five	Totals
Page four	Totals
Page three	Totals
Page two	Totals

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Overall Totals  
General Cognitive Raw Score  
Nonvocal Cognitive Raw Score

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PART VI. Notes and comments

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APPENDIX F

CAS-2: GH-TWI

CAS -2 \_\_\_\_\_ Profile/ Nhwesɔ mma nwoma

Adwenemu ahɔɔden nsanɛɛ-ɛfa a ɛtɔ so mmienu

Mfitiaseɛ sukuu form firi abosome aduonu nan kɔsi abosome aduanan nsɔn

ɛfa a ɛdi kan. Akyere kwan ho nsem

Abofra din \_\_\_\_\_ ɔbaa  ɔbarima

Nsɔhwe da \_\_\_\_\_ Nhwesɔɔ din \_\_\_\_\_

Awoda \_\_\_\_\_ Nhwesɔɔ abɔdin \_\_\_\_\_

Mfɛɛ nnidisoɔ \_\_\_\_\_ Awofɔɔ din \_\_\_\_\_

Mfɛɛ wɔ bosome mu \_\_\_\_\_ Mfitiaseɛ sukuu

Mansini a sukuu wɔ anaa faako a ayaresabea wɔ

\_\_\_\_\_ ɛfa a ɛtɔ so mmienu. Mma ho records

Raw ɔha	Mfɛɛ	Quotient	SEM	Confidence	Quotient
Score nkyɛmu	Nhyeanamu			Interval	Range
(GCQ) _____	_____	_____	_____	_____	_____
NCQ _____	_____	_____	_____	_____	_____

Nsòhwe foforo Data

Din	Nsòhwe da	Nhwesò mma	CAS-2 Nhyeanamu
1.	_____	_____	_____
2.	_____	_____	_____

efa etò so mmeensa. Mma ho nhyehyee	efa etò so nan. Nhwèè ne mmuaee
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---

efa a etò so num. Nneema ho record ne performance

---

Kae se: Mmofra hye nnema no nyinaa ase firi nneema edi kan. empim baabi ara. Mfee no a ehye parenthesis a edidiso kyere mfee oha nkyemu aduonu num.

---

Dee edi kan. Kasa

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Nneema ho nhyehyee firi baako kosi du

Nsemfua gyinabea: Wotumi bo nneema so bio se ehia a.

1. Fa adaka (nifa no nhwe soro) ne coin no to pono no so. Kyere coin. Ka se, “Coin no nie. Fa coin no hye adaka no mu.” Ma aba se coin no hye adaka no mu. (24m)
2. Kyea adaka no wo pono so na fa coin no ma abofra no. Ka se, “Fa coin no hye adaka no ase.” Ma aba se coin no hye adaka no ase. (36m)
3. Fa nnaka mmienu si pono no so ma ekwan nna ntamu inches nan. Ka se, “pia nnaka no bomu.” Ma aba se nnaka no bomu anaa o pia nnaka no nyinaa preko pe. (37m)
4. Fa adaka a akyea no ne slit wo pono no to Wo slit no so fa lip hye ramp no so. Ma abofra no kaa. Ka se, “Ma kaa no nko ramp no so.” Kyere ramp no. Ma aba se kaa no ko ramp no mu. (24m)
5. Gyaee kaa no wo adaka no so. Ka se, “Fa wo nsa ka kaa no soro.” Ma aba se ode ne nsa kyere kaa no soro. (30m)
6. Ka se, “ma ka no nko ramp no ase. Ma aba se kaa no ko ramp no ase. (24m)
7. Fa adaka ne kaa si abofra no anim. Ka se, “Ma kaa no ntwahyia adaka no ho.” Ma aba se kaa no tumi twa adaka no ho hyia a. (39m)
8. Adaka no da pono no so no, ma abofra no kaa na ka se, “Fa kaa no ben adaka no.” Ma aba se kaa no ben adaka no a. (38m)
9. Fa kaa no ben adaka no. Ka se, “Fa kaa no firi adaka no ho.” Ma aba se kaa no firi adaka no ho a. (30m)
10. Fa kaa no si pono no so. Ma abofra no coin. Ka se, “Fa coin no si kaa no anim.” Ma aba se coin no si kaa no anim. (47m)

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Nneema nhyehyee firi dubaako kosi aduonu

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Edin: edi kan, fa nsemfua krataa a kyerε kasaho nhyehyee. Se wo sɔ wɔɔnom hwe wɔ kasaho a, san fa nneema a enim no na fa ɔɔmo kae nhyehyee no sɔ wɔɔnom hwe.

Kasaho nhyehyee: Kyere nsemfua krataa no kakrakakra. Ka se, “wei ye deen?” Se abofra no bo adee bi a enye adekoro no a (nhwesoo, fruit bere a wohwehwe apple), ka se, “Dee he bi a?” Ma mma mmienu se abofra no kyere mfonɔ no yie a.

Kaeho nhyehyee: Kyere nsemfua krataa mmeensa (mfonɔ baako a efa edin a wobeso wɔɔnon ahwe ho ena mmienu biara wobeyi afiri mfonɔ no mu). Ka se, “Kyere me \_\_\_\_ (edin no a ayera no kasaho)”. Sesa krataa mmeensa no gynabea aberε biara wobeso wɔɔnom ahwe awie. Ma nsɔ wɔɔnom nhwe mfa krataa mmienu no a wofaa no biara gye se kasaho no yeraa ye. Sɔ edin biara hwe mpre nan. Se abofra no nya emu mmeensa ma no aba baako fa saa krataa no ho.

Kae se: Mmienu na eye aba a emu eduru ma adee baako; ɔntumi ma adee baako nkoa mmienu ne baako. Adeε biara ye aba mmienu se abofra no twa no yie, ma aba baako se abofra no kyere mfonɔ mpre nsa anaa hwe se abofra no antumi anye emu biara. Se ɔnkasa, abofra no tumi a, baako anaa hwe.

Krataa	Aba
11. dadeponko (24m)	dadeponko, dadeponko
12. apple (24m)	apple (se “fruit,” ka se, “Dee he bi ara?”)
13. anomaa (24m)	anomaa, birdie
14. nantwie (24m)	nantwie, moo nantwie
15. nwura (24m)	nwura, nwunu, ahwehweniwa
16. abosobaa (26m)	abosobaa (se “tool” ka se “Dee he bi ara?”)

- |     |                   |                               |
|-----|-------------------|-------------------------------|
| 17. | dabodabo (26m)    | dabodabo, duckie              |
| 18. | wagon (26m)       | wagon                         |
| 19. | adurananho (26m)  | adurananho, sockie, stocking  |
| 20. | sonkuronsuo (26m) | sonkuronsuo, ɔbaa sonkuronsuo |

Nneemaho nhyehyee firi aduonu baako kɔsi aduonu nan

Edinnsiananmu: Di kan fa kasaho nhyehyee sɔ nneema no hwe. Se abofra no twa no yie a, fa kasaho nhyehyee toa deɛ edidisɔ no so. Se abofra no antumi ankyere kasaho a, ma no kaeho nhyehyee fa edinnsiananmu no ntem paa. emma abofra no nhu nsenkyerene biara. ensesa nsemfua no ho akwankyerɛ. Se wohwe na se ehia bɔ nneema no so mpre baako. Aba mmienu na wobetumi de ama adeɛ baako. Wontumi ma adeɛ baako biara mmienu se abofra no de edinnsiananmu hye kasamu mu a, ma aba baako se abofra no tumi kyere faako a examiner no de edinnsiananmu no ahye a, anaa hwee se abofra no antumi ankyere emu biara. Se abofra no ankasa, ɔbetumi anya baako anaa hwee.

21. (Kasaho) Ma abofra no kuruwaa baako. Wo nso fa kuruwaa. Fa nkuruwaa no sisi pono no so. Ka se, “Baako ye wo deɛ ena baako ye me deɛ.” Kyere wo kuruwaa no na ka se, “Hwan kuruwaa nie?” Se abofra no kyere a, ka se “mankyerɛ me, ka kyere me.” Ma mma mmienu se abofra no tumi ka “wo” anaa “wo.” (26m)

(Kasaho) Ka se, “Wo kuruwaa no wɔ he?” Ma aba baako se abofra no kyere ne kuruwaa no a.

22. (Kasaho) Kyere abofra no kuruwaa na ka se, “Hwan na ɔbenom nsuo afiri kuruwaa no mu?” Se abofra no kyere a, ka se “mankyerɛ me, ka kyere me.” Ma mma mmienu se ɔtumi kyere “me”. Mamma no aba se ɔka “me”. (25m)

(Kaeho) Ma abofra kɔfe aketetwua. Ka se, “mepaakyew, mepɛ kɔfe no bi.” ensesa nsemfua fa adeɛ no ho efiri se woɛsɔ abofra no ahwe se ɔte edinnsiananmu me ase a. Ma aba baako se abofra no hwie kɔfe wɔ wo kuruwaa no mu a.

23. (Kasaho) Fa akuaba mmienu no to pono no so. Ma akuaba baa no kuruwaa. Ka se, “Ka kyere me akuaba ben na ekuta kuruwaa no. Se abofra no kyere a, ka se “daabi, mankyere me. Ka kyere me akuaba no a ɔkita kuruwaa no.” Ma mma mmienu se abofra no tumi kyere “ɔ”. Mma aba mfa “akuaba no ho”, “abaayewaa no” anaa “no”.

(Kaeho) Ma abofra no atere. Ka se, “ɔpe atere”. Ma aba baako se abofra no tumi ma akuababaa no atere a.

24. (Kasaho) Ma akuaba barima no kuruwaa. Ka se, “Mede kuruwaa na maa hwan?” Se abofra no kyere a, ka se, “daabi mankyere me. Ka kyere me. Ma mma mmienu se otumi kyere no. Mamma aba mfa “akuaba no” anaa “papa no” (32m)

(Kaeho) Ka se, mepaakyew, “ma no kofe no bi”. Ma aba baako se abofra hwie kofe akuaba barima no a.

Nneema nhyehyee firi aduonunum kosi aduasa

Syntax: Ma nneema no nyinaa aba hwee anaa baako. Dee onkasa no aba nim.

25. Hwe se abofra no de edin-adeye bomu (nhwesoo, “papa ko.” Se woanhu saa wo abofra kasa mu, ma ne maame anaa kyeekyereni mmisa abofra no nsemmisa eba no de nsemfua mmienu abomu, te se “wo maame (anaa wo papa )ye deen?” Ma aba fa edin-adeye. (33m)

26. Kyere abofra no kofe kuruwaa mmienu no. Ka se, “kuruwaa nie” na ma kuruwaa baako so. Afei ma kuruwaa mmienu no so na ka se, “Weinom ye deen?” Ma aba fa kuruwaa no ho. ewo se abofra no de dodoo kabea ka kuruwaa no ho. (37m)

27. Kyere mfonɩ a ɔbarima retu mirika. Ka se, “ɔbarima no reye deen?” Ma aba fa “retu mirika”, “renante”, anaa adee ehia -ing adeye. (34m)

28. Kyere ataadee ehye n’awofoɔ anaa onipa foforo, te se mpaboa. Ka se, “Hwan mpaboa nie?” Ma aba se ontumi kyere possessive te se ne papa. (32m)

29. Hwe se nsɔhwe no mu no abofra no de article (a, an, anaa no). Ma aba fa article biara ho. (34m)

30. Ka se, “kyere me se wohohoro wo nsa deen na woreye?” Se ehia, ka se, “edeɛn bio na woye?” Ma aba se abofra no ma nneema mmiensa edidisoo fa nsa hohoro ho (nhwesoo “bue nsuo no, fa semina to ne nsa mu, di anwumere aduane”). Ne nnidisoo no ho hia. (47m)

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Dee eto so mmienu. Akenkan

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Mma: Adee biara nya hwee anaa aba baako.

1. Ma abofra no Mikey's Favorite Things nwoma, dane no hwe fam. Ka se, "Ye no yie senea ebeye a wobetumi ahu." Ma aba se abofra no dane hwe soro a. (26m)

2. Ka se, "bue krataa fa no ma me." Ma aba se abofra tumi bue krataa fa baako anaa bebree a (esene nwoma no nyinaa a) (26m)

3. Wode krataa fa a eto so mmienu ne nwotwe wo Mikey's Favorite Things nwoma. Ka se, "Kyerε me anomaa no. Kyerε me nhwiren a ewo kukuo no mu seesei a. "Se ehia, ka no bio. Ma aba se otumi kyere mfonu mmienu no a. (25m)

4. Kyerε krataa fa eto so nan wo Mikey's Favorite Things nwoma. Ka se, "Kasa fa mfonu wei ho kyere me. Deen na εko so wo ha?" Kyerε mfonu no. Se abofra no de kasasin baako pe, ka kyere no se "ka bebree kyere me. Deen na εko so wo ha?" Ma aba se otumi de edin-adeye kasasin a. (41m)

5. Ka se, "tie. Merebeto anansesem akyerε wo. Toby kramaa dwane firii fie. ofirii fie nnaawotwe mmienu. Toby wrehoε. ohwehwe no baabiara. Da koro bere a Toby redi agoro wo fie yam, ohweε na ne kraman wv soro. Ne kraman no aba fie. Twen kakra, ka se, "Kasa fa anansesem no ho. Deen na esieε?" Ma aba se abofra no dwene firi anansesem no mu a. (Nhwesoε, okrama din"). Se abofra no antie a (kyere se antie) bere a woreto anansesem no a, gyae saa adee no na ma no hwee. (44m)

6. Twerε A keseε wo krataa no so. Ka se, "edeεn lete nie?" Se abofra no antumi ankyere lete no yie a, twerε lete keseε edi abofra no di kan. Ka se "edeεn lete nie?" Se abofra no din hye aseε firi A, fa B toa so. Ka no baako pe, se ehia. Ma aba se abofra no twa lete no yie a. (47m)

Nneemaho nhyehyeε firi nsɔn kosi dunsia

Kyerε abofra no krataa lete M wo so no. Ka se, "Wei ye lete M. eye "Mmm" te se ano, adwee, anaa nofonsuo." Si "mmm" no so dua bere woka asemfua biara. Afei, fa lete nkrataa S, T, L, F, ne C. Kyerε abofra no baako, baako, na woaka se, "lete wei din de sen?" Twen kakra ma abofra no ma mmuaeε. Afei, ka se, "edeεn sound na saa lete wei ye? edeεn na lete no ka?" Ka no baako pe se ehia a. Ma aba baako se abofra no tumi bo lete no din yie a. Ma aba baako se abofra no tumi bo lete no yie

7. din S (47m)

8. ye S sound (47M)

9. bo T din (47m)

10. Yε T sound (47M)

11. bɔ L din (47m)

12. Yε L sound (47m)

13. Bɔ F din (47m)

14. Yε F sound (47m)

15. Bɔ C din (47m)

16. Yε C sound (47m)

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Dee eto so mmeensa. Akontabuo

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Mma: Ma adee biara hwee anaa aba baako. Adee a ehia kasa ho mmuaee, ma aba se abofra no ye mfosoɔ wɔ ne kasa mu mpo a.

1. Fa coin nan ne adaka to si pono no so. Ka se, “Fa coin no nyinaaa gu adaka no mu.” Si “nyinaa” so pi. Ma aba se ɔde coin nan gu adaka no mu a. (24m)

Nneema ho nhyehyee firi mmienu kɔsi nkron

Ma abofra nsɔhwe mpre nan. Sesa nneema no gyinabea bere biara wobeso abofra no ahwe. Ma abofra no mmuaee se ɔwie nsɔhwe a etwa toɔ a. Ma aba se abofra no tumi yi nneema mmiensa yie a.

2. Fa kuruwaa kɛsee ne ketewa paa ben ho wɔ pono no so na kyere kuruwaa no. Ka se, “kyere me kuruwaa kɛsee no.” Ma aba se abofra no tumi kuruwaa kɛsee no mpre nsa. (32m)

3. Ma no te se nneema etɔ so mmienu, agye se woka se “kyere me kuruwaa no seesei a.” Si “seesei” so pi se abofra no behu se nneema no nhyehyee asesa. Ma aba se abofra no tumi kyere kuruwaa ketewa no mpre nsa. (29m)

4. Fa adaka a coins du wɔ mu no ne adaka to no si pono so n aka se, “Adaka ben na hwee nnim?” Ma aba se abofra tumi kyere adaka to mpre nsa a. (38m)

5. M no te se nneema etɔ so nan gye se ɔka se, “seesei kyere me adaka a aye ma no.” Si “seesei” so pi se nea abofra no behu se nneema no nhyehyee asesa. Ma aba se abofra tumi yi adaka no a aye ma no mpre nsa. (39m)

6. Fa twerɛdua akokɔsradee tenten no ne tiatia kura na fa kyere pono no. Ka se, “kyere me twerɛdua tenten no.” Ma aba se abofra no tumi kyere twerɛdua tenten no mpre nsa a. (43m)

7. Ma no te se nneema etɔ so nsia, gye se ɔka se, “seesei kyere me twerɛdua tiatia no. Si “seesei” so pi se nea abofra no behu se nneema no nhyehyee asesa. Ma abofra no aba se ɔtumi kyere twerɛdua tiatia no mpre nsa. (43m)

8. Fa coins edidisoɔ num ne coins a edidisoɔ mmienu to pono so. Ka se, “Pile dee he na ewɔ coins dodoɔ?” Ma abofra no aba se ɔtumi yi pile a coin num no mpre nsa. (44m)

9. Ma no te se nneema etɔ so nwɔtwe, gye se ɔka se, “seesei pile ben na ewɔ coins kakrakakrabi?” Si “seesei” so dua se nea abofra no behu se nneema no nhyehyee asesa. Ma abofra no aba se ɔtumi yi pile a coin mmienu no mpre nsa. (46m)

Nneema ho nhyehyee firi du kɔsi dubaako

Nsɔhwɛ no nyinaa ka sɛ, “saa nterɛdua no nyinaa yɛ pɛ anaa ɛda nso. Saa nsɔhwɛ ɛyɛ pɛ fa ntwɛrɛdua akokɔsradeɛ mmienu. Dɛɛ ɛda nso no fa twɛrɛdua akokɔsradeɛ ne twɛrɛdua a ɛnyɛ akokɔsradeɛ. Ma abofra no aba koro sɛ ɔfa “pɛ” yie mpre nsa a. Ma abofra dɛɛ ɛda nso sɛ ɔfa “nsonsoeɛ” yie mpre nsa a.

Nsɔhwɛ \_ Pɛ \_ nsonsoeɛ \_ nsonsoeɛ \_\_ Pɛ \_\_ Pɛ \_ nsonsoeɛ \_ Pɛ \_ nsonsoeɛ

10. Pɛ (47m)

11. Nsonsoeɛ (47m)

12. Ka sɛ “woadi mfee sɛn? Kyerɛ me wo nsamma.” Sɛ abofra de n’ano yi ano a, ka sɛ, “Yoo, seesei fa wo nsamma kyere me.” Ma abofra aba sɛ ɔma ne nsamma so yie. Ka no baako pɛ sɛ ɛhia. (44m)

13. Ka sɛ “baako, mmienu, mmeensa, ɛnan, ɛnum. “Seesei wo kan.” Ma aba sɛ ɔtumi kan kɔduru num a. Ka no baako pɛ sɛ ɛhia a. (43m)

14. Fa nesting kuruwaa si tower no so. Kyerɛ tower na ka sɛ, “hwɛ.” Fa nkuruwaa nan biara ma abofra no. Ka sɛ, “Wo yɛ.” Ma aba sɛ ɔtumi de kuruwaa nan no si tower firi kɛsɛɛ mu kɔ ketewaa mu. Ka no baako pɛ sɛ ɛhia

15. Fa nsuomnam mfonɛ strip to pono so. Fa nsuomnam mfonɛ nkrataa no ne strip no nni nhwe anim na fa krataa biara to strip mfonɛ no ase na ka sɛ “Fa nsuomnam baako ne nsuomnam baako, nsuomnam mmienu ne nsuomnam mmienu, nsuomnam baako ne nsuomnam baako, ne nsuomnam mmienu ne nsuomnam mmienu.” Yi mfonɛ krataa no, ma endi afrafra na fa ma abofra no. Ka sɛ, “Yɛ no seesei a.” Ma aba sɛ ɔtumi de mfonɛ no hwɛhwɛ anim yie a. (46m)

16. Fa bɔɔlo mfonɛ strip no to pono so ka sɛ, “Seesei yɛ baako wei.” Ma abofra no bɔɔlo nkrataa afrafra no. Ka bio sɛ ɛhia. Ma aba sɛ ɔtumi de mfonɛ no hwɛhwɛ anim yie a. (46m)

17. Fa krataa nɔma mmienu wɔ so no kyere abofra no. Ka sɛ, “Dɛɛ nɔma nie?” Afei kyere no nkrataa num na ka sɛ, “Deen nɔma nie?” Ma aba sɛ ɔtumi kyere nɔma no yie a. (47m)

18. Fa coin nan si ne tenten mu si abofra no anim. Ka sɛ, “coins sɛn na ɛwɔ hɔ? Kenkan.” Twɛn kakra na abofra no ma mmuaɛɛ. Yi coins no na afei ma no coins mmienu wɔ no tenten mu si abofra no anim. Ka sɛ, “coins sɛn na ɛwɔ hɔ? Kenkan.” Sɛ abofra no amfa ne nsa anka coins no abere a ɔrekan no.” Ma abofra no aba sɛ ɔma mmuaɛɛ fa nneɛma mmienu no ho a. (46m)

19. Ka se, “baako, mmienu, mmeensa. “Deen noma na edi kan?” Twen kakra ma abofar no ma mmuaee. Afei ka se, “mmienu, mmeensa, enan. Deen noma na edi ho?” Ma aba se otumi yi nneema mmienu no yie a. Ma aba se abofra tumi de noma no bi bomu a.

20. Fa coin du to abofra no anim. Ka se, “Ma me coin nan.” Fa wo nsa mmienu kyere abofra no. Twen kakra gye mmuaee. Fa coins foforo hye coin 10 no anan mu. Ka se, “seesei ma me coins mmiensa.” Fa wo nsa mmienu kyere abofra no. Ma aba se otumi ma mmuaee fa nneema mmienu no ho a. (47m)

Nneema ho nhyehyee firi aduonu baako kasi aduonu mmienu

Fa coins akuokuo baako, mmienu, mmeensa be nan to pono so biarabiara. Ma aba se otumi de coins no hwe animu animu yie a.

21. Fa krataa no a noma mmienu wo so no ma abofra no na ka se, “Fa coins akuokuo no se ene krataa wei ye pe a.” Yi krataa no firi mu se abofra no yi eno a. (47m)

22. Fa krataa no a noma baako wo so no na ka se, “Fa coins akuokuo no se ene krataa wei ye pe a. (47m)

Mma: Nneema mmeensa kɔsi nsia wɔ ntwereɛ symbol reproduction krataa fa (ɛfiri pad no a ɛwɔ kit no mu). Se nea wobema mma no wɔ examiner's manual a ɛwɔ krataa fa etɔ so du. ɛfa kasa ne deɛ ɔnkasa ho mma ho, nneema baako ne mmienu kenkan hwee anaa baako, na nneema mmeena kɔsi nsia ma hwee, baako, anaa mmienu.

1. Hwe abofra no atenaseɛ ne ne ntwere bere a worema nneema mmeensa kɔsi nsia no.

Ma aba baako se ɔtumi de ne nsa ɔmfa ntwere no so krataa no mu yie a. Ma hwee se ɔantwase yie a anaa se ɔantwera a. (24m)

2. Saa nneema wei fa se ɔrehwe abofra no wɔ nneema mmeensa kɔsi nsia. Ma aba baako se abofra no de nsamma kura twerɛdua. Se ɔmfa ne nsa yam ankura twerɛdua no. Ma hwee se ɔde ne nsa yam anaa ɔankura twerɛdua no mu yie a. (35m)

Nneema ho nhyehyee firi mmeensa kɔsi nsia

Fa ntwereɛ ho symbol reproduction krataafa ma abofra no. Ka se, "Mepɛ se wo draw biribi ma me. Draw wei. Draw wo deɛ wɔ ha." Kyere no symbol ne faako a wope se abofra draw. Hwe se abofra beye no yie. Se abofra no antumi andraw symbol no yie a, ka se, "Hwe me se me draw." Hyɛ abofra no nkuran se ɔhwe wo se wo draw no nkakrankakra. Vertical lines ne lines tenten mu ka se, "zoom!" bere a wo draw no. Ka se "seesei wo nos draw." Ma aba mmienu se ɔtumi hwe symbol no so yie bere a examiner no adraw awie no a. Ma aba baako se ɔtumi hwe examiner no so deɛ yie paa.

3. Copies circle = 2 (42m)                      imitates circle = 1                      incorrect/daabi mmuaɛɛ = 0

4. Copies vertical line = 2 (37m)                      imitates vertical line=1                      incorrect/daabi mmuaɛɛ=0

5. Copies line tenten=2 (42m)                      imitates line tenten =1                      incorrect/daabi mmuaɛɛ=0

6. Copies plus sign = 2 (45m)                      imitates plus sign =1                      incorrect/daabi mmuaɛɛ=0

ɛfa adekyere ho, kae se abofra no behu twerɛdua inch baako ɛfiri n'ano :

aane      daabi

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Dee eto so num. Enabling suban

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Nneema ho nhyehyee firi baako kosi mmeensa

Kasa asuadee: Wode nsemfua “petals,” “stem,” “bouncy,” “hoppity,” ne “critter” ka kyere abofra no, ka se \_\_\_\_\_. “Fa akuaba (nhwiren, bɔlo, squeaky akuaba) nya mmuaee. Nhwesoɔ, fa bɔlo bobo pono no so mpen bebree na ka se “Bouncy” ye squeaky akuaba hop wɔ pono no so na ka se, “Hoppity” anaa fa nhwiren nya mmuaee nya mmuaee fa “petals” ne “stem” ho na kyere squeaky akuaba na nya “critter.” Ma aba baako se otumi sua mpre baako pe a. Se osua mpre nsa fa ye asemfua. Se osua nsemfua num wobetumi de anya asuadee mmeensa. Dee osua nsemfua wɔ ha no ye se obefiri ne pemu asua asene se obeka nsemfua no. Ma aba se dee okaa ye no ben dee wirehewwe no, se woanka no yie koraa.

1

2

3

- a. Petals
- b. Stem
- c. Bouncy
- d. Hoppity
- e. Critter

Nneema ho nhyehyee firi nan kosi nsia

Physical asuadee: Kyere suban no mu baako. Woreyi asomu, wode wo nsa fa ne mfono so, ehwene a amoamo, wode wo na ereka ne kon, anaa wode wo nsa ereka ne ti. Ka se, “hwe.” Sua suban baako. Afei ka se, “wo ye.” Ma aba baako se otumi de ne nsa ye no preko pe. Se otumi sua no mpre nsa otumi ma no asusdee baako. Se otumi sua no mpre num a obetumi anya asuadee mmeensa. ofiri ne pe sua a eno na ehia. Se eben ho a, ma aba.

4

5

6

9. Asom
10. Mfono
11. ehwene
12. ekɔn
13. efiri

Nneema ho nhyehyee firi nsɔn kɔsi dummeensa

Memory: Nneema edidisoɔ yɛ kasamu mmienu. Sɛ abofra no tumi ka kasamu a edi kan no yie a, ma aba fa saa nneema no ho na toa so kɔ kasamu a etɔ so no. emma kasamu a efa deɛ edi kan no ho. Sɛ abofra antumi anka kasamu no a edi kan no a na wode deɛ etɔ so no ama no. Ma w'ani ngye bere a wode kasamu no ma abofra no. Sɛ abofra no antumi anka kasamu no mpre mmienu so a mantoa so (kasamu mmienu no). Hwe sɛ abofra no adwene wo so ansa na wode kasamu no ama no. Ma aba sɛ ɔtumi ka kasamu no biara.

7. a. Ka sɛ “mepɛ nofonsuo.” (32m)  
b. Ka sɛ “eyɛ me deɛ.”
8. a. Ka sɛ “mepɛ sɛ me draw.” (35m)  
b. Ka sɛ “Anomaa no tumi tu.”
9. a. Ka sɛ “Nsuomnam tumi dware ntem.” (37m)  
b. Ka sɛ “Mepɛ bɔɔlo bɔ.”
10. a. Ka sɛ “Mepɛ mirika tu ne ahwiri.” (42m)  
b. Ka sɛ “ɔkra no pɛ nofonsuo.”
11. a. Ka sɛ “Mepɛ me nwoma draw.” (44m)  
b. Ka sɛ “Nsuomnam tumi dware soro ne fam.’
12. a. Ka sɛ “ɔpue twee ne dadeponkɔ.” (47m)  
b. Ka sɛ “ɔpue nante kɔtɔ kwan no so.”

13. a. Ka se “okoo sitoo kotoo paano bi.” (47m)  
b. Ka se “okraman no wo ahyenso fitaa ne tuntum wo ne ho.”

Nneema ho nhyehyee du nan

Span: Ka kyere abofra se onka nsemfua edidiso nni w’akyi. Se abofra no ye mfomsoo gyae nsemfua no bobo. Ma aba se abofra no bo nsemfua no yie. Ma no list mmienu no Ma w’ani ngye bere a worema abofra no nsemfua no. Ma aba se obo noma kesee no yie (fa list kesee no, nye ne mmienu nyinaa). Mma no beye hwee, baako, mmienu, mmeensa anaa nan.

Correct

14. List a. obaa (24m)  
daabodaabo-sock (27m)  
okra-boolo-nantwie (38m)  
anomaa-nsuomnam-dua-obarima (47m)
- List b. nantwie (24m)  
obaa-dua (27m)  
obarima-dadeponko-sock (38m)  
daabodabo-nsuomnam-boolo-anomaa (47m)
-

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Krataa fa eto so nwotwe	Totals
Krataa fa eto so nson	Totals
Krataa fa eto so nsia	Totals
Krataa fa a eto so num	Totals
Krataa fa eto so nan	Totals
Krataa fa eto so mmeensa	Totals
Krataa fa eto so mmienu	Totals

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Overall Totals

General Cognitive Raw Score

Nonvocal Cognitive Raw Score

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Dee eto so nsia. Notes and comments

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APPENDIX G  
TEST REPORT

Dear Parents:

Thank you very much for allowing B to assist me with my research project for my thesis. The following is a summary of your child's performance on the Cognitive Abilities Scale-Second Edition: Ghana. Results include examples of skills B demonstrated and examples of skills that would be appropriate to work on next. If you have questions about the results, please call \_\_\_\_\_; I will be happy to discuss them with you. I hope you find the results helpful.

**Language.** Examples of skills B demonstrated in this area include understanding the position words *in, , up, down, top, next to, away from, in front of* and *around*, labeling pictures of objects such as a *glasses, wagon* and *hammer*, understanding and using several pronouns, using noun-verb combinations, regular plurals (e.g., cups), and *-ing* verbs such as *running* in her speech

Language skills she is likely to learn next include more frequent use of pronouns in her speech (e.g., she and him), and understanding the position words *together*, and describing events in order (e.g., answering the question "What do you do when you wash your hands?") and use of possessive with 's(e.g., daddy's).

**Early Reading.** She turned books right side up to look at them, turned book pages one-at-a-time, and remembered an idea from a story read to her.

Skills to develop next are pointed to pictures named by the examiner, learning letter names and letter sounds. Learning letter names is useful, but it is the letter sounds that are helpful for reading.

**Early Math.** B understood the math concepts *all, big, little, empty, full, tall, short, same,* and *different,* correctly held up her fingers to show her age, counted to 5 in imitation, and matched pictures of quantities of 1 and 2 objects.

A skill to learn next include understanding more math concepts such as *more* and *few,* counting different groups of objects and answering the question, “How many?” To do this the child must recognize that the last number stated when counting answers the question.

**Early Handwriting.** She held the pencil with her fingers rather than her fist and correctly copied a circle, a vertical line, a horizontal line, and a plus sign from a picture. Thus, she has good control of the pencil.

**Enabling Behaviors.** This section assesses physical and verbal imitation and memory, skills important for school success. B readily imitated both words and gestures and exhibited a very good memory for information she hears. Imitation helps children learn new skills and practice others.

B’s skills important for later school success are developing well and it was a joy to work with her.

Cordially,

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