

Speech and Language Screening of Kindergarten Children using Alternate Professional Testers

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Abstract

Public health nurses and learning assistant teachers were trained to screen the speech and language abilities of kindergarten age children. Nearly 600 children were screened by these two groups of alternate professional testers over a three year period. While both groups were found to be effective testers, the screening results of the public health nurses more strongly correlated with those obtained by speech-language pathologists. The screening instrument and inservice training procedures are described.

Les infirmières de santé publique et les instituteurs auxiliaires d'instruction ont été entraînés à rechercher les capacités de parole et langage des enfants de l'âge de jardin-d'enfance. Presque six cents enfants ont été évalués par ces deux groupes d'examineurs professionnels alternatifs pendant une période de trois ans. Tandis que les deux groupes étaient des examinateurs efficaces, les résultats des tests des infirmières de santé publique étaient beaucoup plus en corrélation avec ceux des pathologistes de parole et de langage. Les instruments d'examens et les procédures d'entraînement au travail sont décrits.

Academic success, such as in reading, is dependent on the individual's command of both receptive and expressive language as well as intact functioning of the auditory and visual sensory input channels (Hillerich, 1975). Delays in speech and language development must be considered extremely serious because of the intimate relationship between

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language and cognition (Stangler, et al., 1980). Undiagnosed and untreated speech and language problems are often at the root of a child's academic failure and social maladjustment (Tuomi, 1978). Problems involving language and cognition affect the social, emotional, and educational development of the child in a negative way and make early identification of speech and language disorders essential.

Weiss and Lillywhite (1976) estimate that at least 10% of American children reach school with a speech handicap and at least 5% reach school with handicaps in language structure, grammar, and vocabulary which affect both oral and written communication. Language problems in preschoolers can be subtle and not readily identified. James and Cooper (1967) have shown that teachers fail to identify and refer a significant number of children with speech handicaps, especially when the problems are of mild to moderate severity. Specifically, the percentage of accurate referrals increased as severity of the problems increased, from 28.7% of mild problems to 87.5% of severe problems. Van Hattum (1969) and Kirschenbaum et al. (1977) concur and in addition, report that two out of ten severe problems were not reported by teachers. Screening these abilities early seems justifiable and far more sensible than waiting until difficulties are compounded by other problems.

The purpose of screening speech and language skills is to select children with significant communication problems by screening a total population with a brief but discriminative test procedure (Emerick and Hatten, 1974). A screening program may be the first step in effective identification of children who may require special assistance in developing their optimum abilities. Such a program is only as effective as the component screening tool and its administration.

Cost of screening programs is of major concern (Frankenburg and Camp, 1975). The factors of

acceptability, simplicity, reliability, validity, and appropriateness all serve to control costs and ensure that the screening is as inexpensive as possible. Yes-no criteria for referral yield the most reliable and inexpensive results (Frankenburg and Camp, 1975). The ultimate cost will vary with the size of the population and the personnel used in administration. The need for decreased cost and increased accountability makes the search for appropriate screening administrators increasingly more important. Ultimately the choice of screening administrators will depend on the availability of personnel, time of year, how much knowledge and training is necessary to administer and interpret the instrument, school policies, community attitudes, interest in screening by classroom teachers and specialists, budget, and union contracts (Zeitlin, 1976).

Traditionally, speech and language pathologists have administered speech and language screening tests (Tuomi, 1978). Frequently geographic distribution, manpower, and high costs preclude screening availability to large numbers of children by speech-language pathologists. It has been reported that untrained or inexperienced professional testers can be trained to be reliable testers of communication skills in children (Siegal, 1972 and Thrift, 1976). It is recommended by Tuomi (1978) that paramedical personnel and teachers may be appropriate for screening administration to alleviate these difficulties. Tuomi (1978) also suggests that physicians and public health nurses may be ideal for speech and language screening as they come into contact with the children and their families on a fairly regular basis. Their recommendations and suggestions usually have a good chance of being adhered to and carry considerable weight. There are no published investigations that deal with the testing effectiveness of learning assistant teachers or public health nurses, who represent two logical pools of professional alternate testers in the public schools of Canada.

This study documents the effectiveness of the use of professional, non-speech-language pathology personnel in a program of early identification of children with suspected communication problems. It is hypothesized that:

- (1) A given child's responses to the screening items will not be significantly different when the administrator is a speech-language pathologist or another adequately trained professional.
- (2) The screening procedure utilizing alternate administrators will accurately identify children with speech and language difficulties. Specifically, there will be no significant difference between the speech

and language screening results (i.e., pass or refer for further testing) and the recommendations following a complete speech and language evaluation (i.e., no intervention necessary versus a recommendation for intervention.)

Procedures

A study was conducted in British Columbia from 1978 to 1981 to develop a program using alternate testers for speech and language screening at the kindergarten level. During the initial year 224 children were screened by speech-language pathologists. An additional 598 children were screened by the two groups of testers.

Current, published, speech and language screening tests vary widely in: the areas they covered, age ranges, administration time and criteria for referral. (Bankson, 1977; Bradley 1976; Danzer, Lyons and Gerber 1972; Hannah and Gardner, 1974; Kalestrom 1975; Meechan, Jex and Jones, 1970; Rogers 1976; Van Riper and Erickson, 1973).

The Kindergarten Language and Speech Screening Test (KLASS) was developed for use by alternate testers in a program of early identification of children with suspected communication problems (Lowe-Heistad, 1982; Faraher-Amidon, 1980). This 50 item instrument covers receptive and expressive language abilities, concept development and speech production, as shown in Appendix A. It was selected for this study because it did not necessitate subjective decision-making on a child's articulation or language performance. Additionally, the recording form provided a section to allow for general comments along with indications of any unusual voice or fluency characteristics. The reliability and validity of the KLASS had been shown when used by appropriately trained testers at the target age levels (Lowe-Heistad, 1982).

Prior to the annual administration of the KLASS a 2-3 hour inservice was held for the alternate tester group. It was felt that a complete, comprehensive inservice was paramount to a successful screening program. The inservice session included a presentation of the test administration along with expected responses, normal articulation for 4-6 to 5-11 years olds, taped samples of normal and abnormal dysfluency and voice quality, and an opportunity for role-playing the administration of several screening items.

The children used throughout the study ranged in age from 4 years, 6 months to 5 years, 11 months

and resided in an urban area of approximately 40,000 people. The school district had an elementary school population of approximately 2,250 children with an average kindergarten enrollment of 250 children annually. The test area represented income divisions that were similar to the entire Canadian population (Lowe-Heistad, 1982). All income levels were included in the screening base because all school areas participated in the screening program. All children with known, gross deviations of hearing, vision, mental ability, or neurological function were excluded as well as children known to be learning English as a second language.

Each child was seen individually for 8-10 minutes for the administration of the KLASS. This procedure was conducted in or nearby the kindergarten classroom during September and October by the speech-language pathologists the first year and by the learning assistant teachers the second year. The procedure was then tried as part of a more comprehensive school-based pre-kindergarten screening program administered by public health nurses in May and June of the kindergarten entry year.

Results

Several statistical measures were utilized to determine the effectiveness of alternate testers. The reliability of judges was measured using two groups of testers. In one instance, the speech-language pathologists simultaneously scored the screening test responses of 15 children. The percentage of agreement on individual items was calculated. The speech-language pathologists agreed on 99.8% of the items and no disagreements changed the child's score from pass to refer for testing or vice-versa. In the second instance the scoring agreement of the public health nurses and speech-language pathologists was compared, based on the responses of 23 children. The percentage of agreement was 99.3% on all items and again no disagreements altered the child's screening status.

Test-retest reliability scores also deal with tester effectiveness. Three separate test-retest reliability scores were calculated within 2-3 weeks of the initial screening. The speech-language pathologists screened 23 children and re-screened the same children for a test-retest reliability of 90%. The public health nurses screened 26 children who were re-screened by speech-language pathologists. Test-retest reliability was 86.77%. The learning assistant teachers screened 69 children who were re-screened by the speech-language pathologists for a test-retest reliability of 84.58%. Correlation coeffi-

cients were calculated for each of the test-retest reliabilities and are presented in Table 1.

TABLE 1
Pearson Product Moment Correlation Coefficients
for test-retest reliabilities

Testers	Number of Children	Correlation Coefficient
Speech Pathologist compared to Speech Pathologist	23	.983
Speech Pathologist compared to Public Health Nurse	26	.95
Speech Pathologist compared to Learning Assistant Teacher	69	.75
TOTAL		118

The correlation coefficient for the speech-language pathologists compared to speech-language pathologists was extremely strong while the speech-language pathologists compared to public health nurses category had a strong correlation. The speech-language pathologists compared to learning assistant teachers coefficient is a moderate correlation (Silverman, 1977).

The screening score decisions of the public health nurses were compared to the speech-language pathologist's results obtained with a standardized test battery that covered receptive and expressive language and articulation skills. The screening test results compared satisfactorily with the diagnostic tests (Lowe-Heistad, 1982). The percentage of agreement between the nurses' screening decision and the speech pathologists' evaluation outcome was 100%. For instance one subject received a passing score of 36/50. The language and articulation testing showed no need for speech and language intervention. Another subject did not receive a passing screening score (17/50) by the nurses and the diagnostic testing showed a need for language therapy.

The "additional comments" section of the screening test is also worthy of mention. In several instances the public health nurses added additional comments that included:

- 1) additional articulation errors (eg. θ for s);
- 2) distractible/unco-operative behaviour;
- 3) prior speech and language therapy;
- 4) hoarse voice.

In each case the nurses' comments were similar to the speech pathologist's comments that were made at the time of the evaluation.

The standardized language and articulation test results and the screening test results were compared and analyzed using a four-fold classification system (Stangler et al., 1980) for an additional validity check. Table 2 indicates the classification of correct, incorrect, over and under-referrals. For the group of children who received complete speech and language evaluations the overall rate of referral was 32%. The overall rate of referral for all of the 1979-81 children who were screened was 12.4%. From the group which received assessments the rates of over and under-referral were 0%. Correct referrals and nonreferrals were 100% respectively.

In addition to the language information gathered during the assessment it is also important to note that none of the children who demonstrated adequate articulation skills on the screening device manifested a need for any articulation intervention by the speech-language pathologist, when evaluated with a complete articulation test.

TABLE 2

Four-fold classification system representing numbers of over and under-referrals as well as correct and incorrect referrals.

Classification by screening	Abnormal	Normal	Totals
positive referrals	correct referrals 8	over-referrals 0	8
negative nonreferrals	under-referrals 17	correct-nonreferrals 17	17
Total examined and screened	$0 + 8 = 8$	$0 + 17 = 17$	25

Discussion

The alternate testers were asked to complete a survey following their testing experience. The majority of alternate testers felt that their objective of early identification of speech-language problems was

achieved. There was general agreement that screening should take place at the time of kindergarten registration or, at the latest, in early September. This affords the kindergarten teacher time to follow-up each child's status. It also means that spaces were available in the speech-language pathologists' caseloads for severe cases which is not necessarily true later in the fall. The learning assistants and nurses felt that the public health nurses were a more appropriate testing group. This was due to the fact that the district was moving towards a comprehensive screening program by the nurses that included general development, hearing, vision and stereopsis. It seemed appropriate to include speech and language at the same time. This was carried out in subsequent years at each school in the district.

The alternate professional testers were reliable screening test administrators of the KLASS when used for the 4-6 to 5-11 age group. The testers were comfortable with the test instrument and found the materials easy to manipulate. Emphasis was placed on appropriate inservice training to ensure tester confidence and competence. The tester competence assists in assuring accuracy with speed when this screening test is included as part of a comprehensive screening program. The alternate testers showed a high percentage of agreement with the speech-language pathologists which corroborates their effectiveness as testers.

Test-retest reliabilities between groups showed that the learning assistant teachers and public health nurses were effective testers. There was a significant difference shown between learning assistant teachers and public health nurses. There could be several reasons for the public health nurses' stronger correlation with the speech-language pathologists. These could include: that the learning assistant teachers had no prior experience testing children under five, whereas the public health nurses had in other areas, (eg. hearing, vision); the same nurses completed the screening testing during two consecutive years whereas the learning assistant teachers had only one test year and hence one inservice; and the nurses worked in a comprehensive screening setting where they could check their item decisions (if in question) with other nurse testers.

The screening test results were determined to be stable over time, regardless of who administered the screening test during this study. These data support the hypothesis that a given child's responses to the screening items would not be significantly different when the tester is a speech-language pathologist or another professional per-

son. It is suggested that, if school districts choose to use other groups of testers (eg. parents, kindergarten teachers) then these groups should also be trained in the test administration. Follow-up procedures and subjective decision making can be done by the school district speech-language pathologists.

This study utilized the KCLASS, a reliable and valid screening test, which is useful in the identification of children with communication disorders. The two groups of professional testers in this study have been shown to be reliable testers when inserviced specifically for the screening test administration.

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Appendix A: Kindergarten Language and Speech Screening Test

Name: _____ School: _____

B/D (age) _____ Administered By: _____

Date: _____

Score	Additional Comments	Yes	No	Further Testing Recommended	Yes	No
50		—	—	—	—	—

- ___ 1a. Show me: The ball has many stars
- ___ 1b. Show me: The ball has some stars
- ___ 2. Show me: wagon; Show Me: ducks
- ___ 3a. Show me: The small, blue block
- ___ 3b. Show me: The large, red block
- ___ 3c. Show me: The small, green ball
- ___ 3d. Show me: The large, red ball
- ___ 4. Show me: The boy *will* go down the slide
- ___ 5. Show me: *farm*; Show me: *farmer*

I am going to say some sentences and I want you to put in the last word for me:

- ___ 6a. Brother is a boy, sister is a _____.
- ___ 6b. In the daytime it is light, at night it is _____.
- ___ 6c. A snail is slow, a rabbit is _____.
- ___ 6d. The sun shines during the day, the moon shines at _____.

- ___ 7a. What do we do with our eyes?
- ___ 7b. What do we do with our ears?
- ___ 8a. Show me: The girl walks.
- ___ 8b. Show me: The girls walk.
- ___ 9a. What is a *house* made of?
- ___ 9b. What is a *window* made of?
- ___ 9c. What is a *book* made of?
- ___ 10. I am going to say some numbers, then I want you to say them just the way I did — Ready? — 4, 7, 1

- ___ 11a. What do you see? (*stars*)
- ___ 11b. What do you see? (*cups*)
- ___ 11c. What do you see? (*dogs*)
- ___ 11d. What do you see? (*busses*)
- ___ 12a. Tell me where the car is. (*in the garage*)
- ___ 12b. Tell me where the pot is. (*on the stove*)
- ___ 12c. Tell me where the mouse is. (*under the chair*)
- ___ 12d. Tell me where the boy is standing.
(*next to/beside the girl*)

Example: What do we do with a *chair*?
We sit on a *chair*.

- ___ 13a. What do we do with a ball?
(*throw it, bounce it, roll it*)
- ___ 13b. What do we do with a hat?
(*wear it, put it on your head*)
- ___ 14. I am going to tell you to do 3 things and I want to see if you can remember all of them. — Ready?
“Put the pencil on your chair, clap your hands and give me the card.”
- ___ 15. Tell me your *whole* name.
- ___ 16. Count to 10 for me.
- ___ 17. I am going to say a sentence, then I want you to say the whole thing just the way I did — Ready?
“Tom has lots of fun, playing ball, with his sister.”
- ___ 18a. If you fell down, what would you do?
- ___ 18b. If you wanted a cookie, what would you do.
- ___ 19a. Tell me what *they* are doing. (*They are painting*.)
- ___ 19b. Tell me what *she* is doing. (*She is sitting*.)
- ___ 19c. Tell me what *he* is doing. (*He is fishing*.)

Say, ‘What is this?’ for each of the following:

- | | |
|----------------|--------------------|
| ___ 20a. p o p | ___ 20f. w a t e r |
| ___ 20b. b e d | ___ 20g. c o w |
| ___ 20c. c a t | ___ 20h. d o g |
| ___ 20d. m a n | ___ 20i. g u m |
| ___ 20e. t u b | ___ 20j. n e c k |

ADDITIONAL COMMENTS: YES NO

- A. Voice Difference
(eg. hoarse, loud, breathy) — —
- B. Fluency Difference
(eg. stuttering) — —
- C. Other — please specify
(eg. English as a second language) — —

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