

Metaphor Performance in Children With Hearing Impairment

Keith S. Wolgemuth

Naval Medical Center, San Diego, CA

Alan G. Kamhi

The University of Memphis, TN

Rene F. Lee

The Bodine School, Memphis, TN



Gilbertson and Kamhi (1995) recently proposed that the population of children with mild-to-moderate hearing loss may contain two

distinct groups: a group of children who performed within normal limits on some language measures and a group of children who did not perform within normal limits on the same measures. Gilbertson and Kamhi based this claim on the finding that half of the 20 school-age children with hearing impairment (HI) in their study performed comparably to children with normal hearing (NH) on standardized measures of expressive and receptive language. Standardized language measures consisted of the Peabody Picture Vocabulary Test–Revised (PPVT–R, Dunn & Dunn, 1981), the Expressive One Word Picture Vocabulary Test–Revised

(EOWPVT–R, Gardner, 1990), and the Structured Photographic Expressive Language Test–II (SPELT–II, Werner & Kresheck, 1983).

The children with hearing loss also performed comparably to NH children on a novel word learning task and on measures of phonological processing (short-term memory and rapid naming). The children in the NH group were, however, approximately 2½ years younger than the other children. In contrast, the other 10 HI children performed more poorly than the NH children and the higher functioning HI children on the novel word learning tasks, all the measures of language, and the short-term memory task. Degree of hearing loss was not significantly related to language- or word-learning abilities.

The claim that there are two distinct groups of children with mild-to-moderate hearing loss differentiated by their language abilities rather than hearing level is inconsistent with the prevailing view that there is a strong link between degree of hearing loss and language abilities/academic achievement. The view that there is a strong relationship between degree of hearing loss and language ability has been maintained despite several studies (e.g., Davis, Elfenbein, Schum, & Bentler, 1986; Gilbertson & Kamhi, 1995; Sikora & Plapinger, 1994) and clinical experiences that argue against this view.

The view that a language impairment is an expected consequence of a hearing loss is based on the erroneous notion that a language impairment can be caused solely by a hearing loss. Although a hearing loss is a major risk factor for a language impairment, a significant proportion of HI children in the mild-to-moderate range do not appear to have significant language-learning difficulties. In the Gilbertson and Kamhi study (1995), half of the HI children performed within normal limits on standardized measures of

ABSTRACT: Metaphor comprehension and use were evaluated in children with hearing impairment (HI) who performed within normal age limits on norm-referenced measures of language. Participants were 13 children with mild-to-moderate sensorineural hearing loss and 12 children with normal hearing and normal development (10:0 to 15:7 years:months). Three verbal metaphor tasks (comprehension, preference, and completion) and one visual metaphor task, the Metaphor Triads Task (MTT), were administered. No significant group differences were found on any of the tasks. Both groups exhibited the same metaphor competence and response patterns on the four tasks. These findings add to a growing body of literature showing that a significant number of children with mild-to-moderate HI have age-appropriate language abilities.

KEY WORDS: hearing loss, children, figurative language, metaphor

language, such as the PPVT-R ($M = 88$) and the EOWPVT ($M = 101$). In a recent study by Sikora and Plapinger (1994), 88% (14/16) of the HI children (7 to 13 years old) also performed within normal limits on the PPVT-R and the EOWPVT-R. As in the other studies, Sikora and Plapinger found no significant relationship between language performance and degree of hearing loss.

Few would argue with the claim that some HI children have better language-learning abilities than other HI children. It is more difficult to accept the claim that as many as half of the HI children do not have significant language-learning abilities. It may be that HI children who function within normal limits on standardized measures of semantics or syntax will have difficulty with other aspects of language that are not measured by norm-referenced tests, such as conversational abilities, narrative discourse, pragmatic abilities, phonological processing, or comprehension and use of figurative language.

HI children who function within normal limits on selected language measures may still have to perform some "compensatory behaviors" to function adequately in the classroom. They may also require intervention for different aspects of language at various stages of language development. Studies that evaluate aspects of language that are not norm-referenced should assist speech-language pathologists in providing appropriate intervention for all children with mild-to-moderate HI.

PRESENT STUDY

In the present study, we examined one of these non-standardized aspects of language—the comprehension and use of metaphor. Four metaphor tasks were administered to school-age HI children (10 to 15 years old) who performed within normal age limits on the PPVT-R or two out of three receptive subtests from the Clinical Evaluation of Language Fundamentals-Revised (CELF-R, Semel, Wiig, & Secord, 1987). The subject selection criterion are described in detail in the next section.

The four metaphor tasks were adapted from a previous study by Lee and Kamhi (1990) that investigated metaphor abilities in 9- to 11-year-old children with language-learning disabilities. There were three verbal metaphor tasks (comprehension, preference, and completion) and one visual metaphor task, the Metaphor Triads Task (MTT, Kogan, Connor, Gross, & Fava, 1980). The verbal metaphor comprehension and preference tasks were adapted from those used in previous studies by Pollio and Pollio (1979) and Silberstein, Gardner, Phelps, and Winner (1982). These investigators administered the tasks to children with typical development ranging in age from 8 to 17 years old. The tasks are described in detail in the next section.

Metaphor abilities have not been extensively examined in children with mild-to-moderate degrees of HI. Studies have investigated metaphor comprehension in children with moderate-to-profound levels of sensorineural HI, using sign, cued speech, and oral-aural modes of communication (Iran-Nejad, Ortony, & Rittenhouse, 1981; Rittenhouse, Morreau,

& Iran-Nejad, 1981; Rittenhouse & Stearns, 1982, 1990). Idiomatic comprehension has also been studied in deaf children (Fruchter, Wilbur, & Fraser, 1984). The majority of the subjects in these studies have exhibited severe-to-profound levels of HI.

For example, the study by Iran-Nejad et al. (1981) investigated the metaphor comprehension in 46 children with profound sensorineural hearing impairment who attended residential schools for the deaf. The children ranged in age from 9 to 17 years. The children were presented with short stories and instructed to choose, from a set of four alternatives, the sentence they thought best completed the story. Despite oral language deficits, the children demonstrated the ability to understand novel metaphors above chance level when they were provided with feedback and instruction on practice items.

Performance on metaphor tasks does not appear to be related to degree of hearing loss (Rittenhouse et al., 1981; Rittenhouse & Kenyon, 1991). In both of these studies, the correlation between hearing loss and metaphor performance was nonsignificant. The earlier study included children with moderate-to-profound losses; the more recent one included children with moderate-to-severe hearing losses.

The principal purpose of the present study was to evaluate metaphor abilities in HI children who perform within normal age limits on selected norm-referenced measures of language. We also examined whether metaphor performance was influenced by metaphor type (novel or frozen), familiarity with the metaphors, and the inclusion of a supportive story context. There is some evidence that the ability to understand and produce metaphorical expressions may be influenced by each of these factors. For example, Pollio and his colleagues (Pollio & Pickens, 1980; Pollio & Pollio, 1979) found that frozen metaphors (e.g., I couldn't believe my eyes) were easier to understand than novel metaphors (e.g., I was amazed my feet were brave enough to take me there) throughout the early mid-adolescent years. In the present study, half of the items on the comprehension task were novel metaphors and half were frozen.

Another factor that may affect metaphor comprehension is the presence of a supportive story context. Ortony, Schallert, Reynolds, and Antos (1978) reported that introducing metaphorical expressions in short story narratives improved metaphor comprehension abilities. In contrast to these findings, Lee and Kamhi (1990) found that short story narratives did not facilitate metaphor comprehension for the groups in their study with or without language-learning disabilities. In the present study, we questioned whether short story narratives would facilitate metaphor comprehension in HI children using the same metaphor tasks used by Lee and Kamhi (1990).

As discussed earlier, some recent studies have indicated that degree of hearing loss does not always predict a child's abilities on selected language measures (Davis et al., 1986; Gilbertson & Kamhi, 1995; Sikora & Plapinger, 1994). A final purpose of the present study was to examine the relationship between degree of hearing loss and performance on the three verbal metaphor tasks.

METHOD

Participants

Participants were 25 children between the ages of 10:0 and 15:7 (years:months). Thirteen had mild-to-moderate bilateral sensorineural hearing loss and 12 had normal hearing and no history of speech, language, or learning disabilities. The children classified as NH were drawn from the same schools and classrooms as the HI children. All the children classified as NH had previously passed a school hearing screening test that was performed in accordance with the American Speech-Language-Hearing Association (ASHA) guidelines for identification audiometry (ASHA, 1985). This involved responding to pure tone stimuli at 20 dB HL for the test frequencies of 500, 1000, 2000, and 4000 Hz. School hearing screenings were performed by both certified speech-language pathologists and audiologists.

Any children who failed the hearing screening were rescreened and underwent tympanometry testing per the screening protocols for both school systems that provided subjects. There were five boys and eight girls in the HI group and five boys and seven girls in the NH group. Four of the children in the HI group and three of the children in the NH group were African American. The remaining children were Caucasian.

Table 1 presents the group means and standard deviations for pure tone thresholds and 3- and 4-frequency pure tone averages for the HI children. Unaided speech reception threshold (SRT) scores in the better ear ranged from 5 dB HTL to 55 dB HTL ($M = 32.0$, $SD = 14.0$). All the HI children were aural/oral and were mainstreamed in the public schools for at least a portion of each school day. All the children had a complete audiologic evaluation during the past year and exhibited bilateral sensorineural hearing loss. One child with a mild sensorineural hearing loss at 2000–4000 Hz in one ear and at 3000–4000 Hz in the other ear did not wear a hearing aid. All but one of the other children wore all-in-the-ear custom hearing aids. The remaining child wore a body-style hearing aid with Y-cord

Table 1. Means and standard deviations (*SD*) for pure tone thresholds and threshold averages for the children with hearing impairment.

<i>Pure tone thresholds (dB HL, combined ears)</i>					
Hz	500	1K	2K	4K	8K
Mean	29.61	45.46	59.61	65.84	50.46
<i>SD</i>	17.10	20.87	21.51	17.20	30.00
<i>Pure tone averages (dB HL, combined ears)</i>					
Hz	3 Frequency (500, 1K, 2K)		4 Frequency (500, 1K, 2K, 4K)		5 Frequency (500, 1K, 2K, 4K, 8K)
Mean	44.53		50.23		52.84
<i>SD</i>	16.60		14.30		15.60

fitting. Listening checks were performed on all the hearing aids before testing began so as to ensure that they were functioning.

In order to participate in the study, children in both groups had to be native speakers of Standard American English, perform within normal limits on the Test of Nonverbal Intelligence–2 (TONI–2, Brown, Sherbenou, & Johnsen, 1990), and be reading on at least a third-grade level. Reading level was verified by either teachers or school administrative personnel. Children in both groups also had to perform within normal age limits on either the PPVT–R or two out of three receptive subtests of the CELF–R (Word Classes, Oral Directions, and Listening to Paragraphs).

Ten of the HI children performed within normal age limits on the PPVT–R. The other three HI children qualified as subjects by performing within normal age limits on two out of three CELF–R subtests. If an HI child qualified according to CELF–R criteria alone, he or she was still required to exhibit a PPVT–R score that was within 2 *SD* of the mean. All the NH children performed within normal age limits on the PPVT–R and CELF–R subtests. Table 2 presents the means and standard deviations for chronological age and standardized language measures for the two groups.

The two groups were matched for grade level, gender, race, and socioeconomic status (SES). SES matching was

Table 2. Group means (*M*) and standard deviations (*SD*) for chronological age and standardized test scores.

	<i>Group</i>	
	<i>Hearing impaired (n = 13)</i>	<i>Normally hearing (n = 12)</i>
Chronological age (in years)	12.92 (1.44)	12.00 (1.21)
Test of Nonverbal Intelligence Range	98.46 (8.04) (85–116)	103.91 (8.15) (93–122)
Peabody Picture Vocabulary Test–Revised Range	95.08 (13.42) (77–127)	103.33 (10.13) (82–116)
Clinical Evaluation of Language Function–Revised* (Word Classes) Range	9.38 (2.50) (5–14)	11.00 (2.49) (8–17)
Clinical Evaluation of Language Function– Revised* (Oral Directions) Range	8.23 (3.77) (4–14)	8.08 (2.81) (4–14)
Clinical Evaluation of Language Function–Revised* (Listening to Paragraphs) Range	11.38 (3.33) (6–15)	11.67 (2.54) (8–15)

*Standard scores (0 to 15).

accomplished by obtaining information about parent occupation and assigning Nam Power's Socioeconomic Status Scores (Nam, LaRocque, Powers, & Holmberg, 1975). These scores reflect a direct, objective estimate of SES based on education, occupation, and income (Nam et al.). The Nam-Powers measure was chosen because it is a multi-item index of SES and is highly correlated with previous assessments used by the U.S. Bureau of the Census.

Procedures

All the children were tested individually in their school for two 60-minute sessions. In the first session, children were administered the TONI-2, PPVT-R, and three subtests of the CELF-R. In the second session, the four metaphor tasks were administered. These tasks are described in the next section. The test rooms used for all subjects were quiet and the lighting was adequate. All testing was performed with the children and examiner facing each other in close proximity across a desk. Twelve of the children with hearing loss were tested wearing their hearing aids. One of the children with a mild bilateral high-frequency hearing impairment who did not wear a hearing aid was tested without using amplification.

Verbal Metaphor Tasks

The three verbal tasks measured comprehension, preference, and completion of figurative language expressions. The three tasks were presented in one of two orders: (1) comprehension, preference, completion, or (2) preference, completion, and comprehension. In both cases, the preference task preceded the completion task in order not to bias figurative language preferences. Each of the three verbal tasks contained 16 items. Practice items were provided for each task. Half of the figurative expressions in all three tasks were preceded by a brief story that provided supportive linguistic context that helped to clarify the meaning of the metaphors. The story for the expression "*I couldn't stand it*" is provided below:

I love the circus. Each spring it comes to our town. There's always a big parade with lots of animals and clowns. Sometimes they pick children to help the clowns with their tricks. One clown chose me. I was so excited, *I couldn't stand it*.

The subject matter of each story was related to the figurative interpretation of each task item. A readability index (Fry, 1977) was used to calculate the reading level of the stories. Mean reading grade levels were 3.5 (range: 1.9–3.9) for the comprehension task, 3.0 (range: 2.5–4.0) for the preference task, and 3.0 (range: 2.6–4.1) for the completion task (Lee & Kamhi, 1990). Specific information regarding each of the tasks is provided below. Individual items for each of the tasks appear in Appendices A through D.

Comprehension. The eight novel and eight frozen metaphors on the comprehension task were taken from similar tasks that were used by Pollio and Pollio (1979) and Lee and Kamhi (1990). Pollio and Pollio (1979) developed their metaphor comprehension task by collecting novel and frozen metaphors from young children's language

samples (Pollio & Pollio, 1974). Adult judges independently confirmed that the metaphors were frozen or novel. The 16 metaphors were followed by four possible interpretations. Children's responses were scored as either correct or incorrect. The literal interpretation of the metaphoric expression was always scored as the correct response. An example of a frozen and novel metaphor is provided below:

In summer, you can feel the sunbeams. (novel)

- It really hurts when you get sunburned.
- In the summer, the sun shines brightly and makes your skin feel very warm.
- When it is hot, the sun presses down hard on you.
- In summer, you can grow beans, because the sun shines so brightly.

The boy was as quiet as a mouse.

- The boy was gray and furry, and had pink ears.
- The boy scurried around the room.
- The boy was very, very quiet.
- The person who said it was only kidding, because boys are not mice.

Preference. The metaphor preference task materials used in this study were similar to those that were used by Lee and Kamhi (1990), who adapted their task from material that was originally developed by Silberstein, Gardner, Phelps, and Winner (1982). The preference task consisted of 16 incomplete sentences followed by one literal, nonmetaphoric completion and four different types of metaphoric completions. Children were asked to select the best ending. The four metaphoric completions were based on static-perceptual (color, shape), dynamic-perceptual (sound, movement), or conceptual features. There were no choices used that combined two features. Responses were scored using a 4-point scale: 0 = literal choice, 1 = static-perceptual choice (e.g., color or shape), 2 = dynamic-perceptual choice, (e.g., movement), and 3 = conceptual choice.

A wave in the ocean is...

- A curl of hair (shape)
- A burst of energy in a tired runner (movement)
- A stack of dishes crashing (movement)
- A lion springing in attack (conceptual)
- Water that goes up and down (literal)

Completion. The metaphor completion items were the same ones that were used by Kamhi and Lee (1990). The task consisted of 16 simile stems that children were required to complete. A simile is a variation of a metaphor that makes an explicit comparison of two dissimilar things using the terms *like* or *as* (e.g., The old car was as noisy as...). Responses were scored using a 4-point scale that was adapted from Schaefer (1971): 0 = literal or inappropriate completions, 1 = poor or questionable response, 2 = conventional metaphorical responses, and 3 = novel or unique metaphorical responses. For example, for the simile

“Timmy was as happy as...,” the response “he had ever been in his life” would receive a score of 0, the response “a bird” would be scored a 1, the response “a purring cat” would be scored a 2, and the response “a 2-year-old getting an ice cream cone” would be scored a 3. All responses on this task were tape-recorded and transcribed verbatim. All responses were scored by both the first author and a trained scorer. Interjudge agreement was 93.0%. Disagreements were resolved through discussion.

Visual Metaphor Task

The ability to comprehend visual metaphors was evaluated by administering the Metaphor Triads Task (MTT, Kogan et al., 1980). The MTT contains 29 sets of three pictorial stimuli, with two of the pictures representing a metaphoric relationship. For example, pictures of a fish and a snake appear side by side at the top half of a page and a picture of a winding river is at the bottom half of the page. Children were asked to point to the picture on the top of the page (fish, snake) that made a good pair with the picture on the bottom (winding river). In this case, the metaphoric pair was the snake and the winding river.

After making their choice, children were then asked to explain why that pair made the best choice. Children were also asked to consider whether the bottom picture could also be paired with the other top picture (in this case, the fish) and, if so, explain the relationship between this pair. The metaphoric relationships involved conceptual, visual, or affective connections. Explanations given for choosing the nonmetaphor pair were not scored. Children’s verbal explanations were tape-recorded as well as transcribed verbatim.

Responses were scored according to the 3-point system that was used by Kogan et al. (1980). A score of 0 was given when the metaphor pair was not selected, regardless of the explanation offered. A score of 1 was given when the metaphor pair was selected, but the explanation was not accurate or complete. A score of 2 was given when the metaphor pair was selected and the explanation was complete. For example, a correct explanation for the example above would be “the snake moves in a wavy way like the river does.” Children’s responses were scored independently by the first author and a trained scorer. Agreement was 95%. Disagreements were resolved through discussion.

RESULTS

Table 3 presents the means and standard deviations for the three verbal metaphor tasks and the MTT. Data for the comprehension task were analyzed with a 2 (group) x 2 (context) x 2 (metaphor type) repeated measures analysis of variance (ANOVA). Performance on the preference and completion tasks were analyzed with 2 (group) x 2 (context) repeated measure ANOVA. One-way analyses of variance were used to analyze the familiarity rankings and the data from the MTT. No significant group differences

Table 3. Group mean (*M*) scores and standard deviations (*SD*) for the three verbal metaphor tasks by context condition and for the Metaphor Triads Task (MTT).

	Group			
	Hearing impaired		Normally hearing	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Comprehension (8)*				
Context Range	6.39 (4–8)	1.56	7.25 (6–8)	0.87
No context Range	7.23 (7–8)	0.44	7.25 (6–8)	0.97
Task total Range	13.62 (10–16)	1.76	14.04 (11–16)	1.51
Preference (24)*				
Context Range	15.62 (12–21)	2.63	16.08 (13–18)	1.51
No context Range	16.77 (7–23)	4.71	17.83 (14–22)	3.04
Task total Range	32.39 (22–42)	6.42	33.91 (28–40)	3.75
Completion (24)*				
Context Range	15.23 (9–19)	3.19	16.41 (10–25)	3.52
No context Range	17.15 (12–23)	3.15	17.41 (15–21)	2.99
Task total Range	32.38 (21–42)	5.98	33.83 (20–41)	5.82
MTT (58)*				
Task total Range	15.15 (3–32)	7.97	19.00 (6–31)	9.04

*Numbers in parentheses indicate the maximum score possible for each context condition and the total MTT score possible.

were found for the three verbal metaphor tasks or the MTT (see Table 4). There were only two statistically significant findings. On the comprehension task, as in previous studies, both groups produced significantly more correct responses for frozen metaphors than for novel metaphors, [$F(1, 23) = 13.48, p < .05$]. On the completion task, both groups obtained significantly higher scores in the no context condition than they did in the context condition, [$F(1, 23) = 8.02, p < .05$].

Correlational Analyses

Pearson-product correlation coefficients were calculated on data from the HI group to examine the relationships between degree of hearing loss and performance on the PPVT–R, the CELF–R subtests, and the three verbal metaphor tasks. Performance on the MTT was not included in this analysis because children in both groups did not

Table 4. Results of analysis of variance for the three verbal metaphor tasks by group, metaphor type, and context condition and for the metaphor triads task (MTT).

Source	F	p
Comprehension		
Group	1.81	.192
Context	2.73	.112
Group x Context	2.73	.112
Metaphor type and comprehension		
Metaphor type	13.48	.001*
Group x Metaphor type	.19	.675
Preference		
Group	.52	.479
Context	4.01	.057
Group x Context	.17	.685
Completion		
Group	.38	.546
Context	8.02	.009*
Group x Context	.80	.380
MTT		
Group	1.29	.670

* $p < .05$.

perform very well. A composite verbal metaphor score was obtained by adding the total comprehension, preference, and completion scores. Degree of hearing loss (as indicated by SRT) was significantly related to the composite verbal metaphor score ($r = -.58, p < .05$) and performance on the CELF-R Word Classes subtest ($r = -.73, p < .05$). The negative correlations indicate that the greater the hearing loss, the poorer the children performed on the metaphor tasks and the Word Class subtest on the CELF-R. No significant relationship was found between degree of hearing loss and performance on the PPVT-R or the other two subtests from the CELF-R (Oral Directions and Listening to Paragraphs).

In examining the individual subject data (see Table 5), the metaphor composite scores ranged from 62 to 90, whereas SRTs ranged from 5 dB to 55 dB. The two students whose SRTs were 55 dB had the two lowest composite scores (62, 65) on the metaphor tasks. These students' hearing level was 20 dB worse than any other student. If one of these students' hearing level was changed to 50 dB rather than 55 dB, the correlation coefficient decreased to $-.55$, which was not significant at the $.05$ level. If one of these students was eliminated from the calculation, the correlation decreased to $-.47$. If both students were eliminated, the correlation decreased to $-.17$. If rank order is considered rather than numeric value, the correlation is a nonsignificant $-.23$ (Spearman's rho). It should also be noted that nine of the 13 students in the study had SRTs ranging from 25 dB to 35 dB, which is a

Table 5. Pearson product-moment correlation coefficients for the HI children between degree of hearing loss (better ear SRT), composite verbal metaphor score, PPVT-R, and individual CELF-R subtests.

	PPVT-R	Word classes	Oral directions	Listening to paragraphs	Total metaphor score
SRT	-0.32	-0.73*	-0.27	0.13	-0.58*

* $p < 0.05$.

very narrow range. There was no clear pattern of performance for these students on the metaphor tasks. In other words, the moderate significant correlation between hearing level and metaphor performance was caused by the performance of one or two students. Individual subject characteristics, standardized test results, and metaphor test results are presented in Appendices E and F.

DISCUSSION

The principal purpose of the present study was to evaluate metaphor abilities in HI children who perform within normal age limits on selected norm-referenced measures of language. In addition, we also examined the effects of supportive linguistic context and metaphor type on verbal metaphor performance. The findings were quite straightforward: No significant group differences were found on any of the tasks. Both groups exhibited the same metaphor competence and response patterns on the four metaphor tasks. The one significant finding in the study was that children in both groups understood more frozen than novel metaphors on the comprehension task. This finding is consistent with previous research (Lee & Kamhi, 1990; Pollio & Pickens, 1980; Pollio & Pollio, 1979) and thus needs no further explanation.

The lack of context effects on the comprehension and preference tasks was consistent with the findings in the Lee and Kamhi (1990) study, but inconsistent with findings from other studies that have found context to facilitate figurative language comprehension (e.g., Ackerman, 1982; Iran-Nejad et al., 1981; Nippold & Rudzinski, 1993). On the completion task, however, children in both groups performed significantly better without the supportive story contexts. Children in both groups evidently had some difficulty making the metaphor fit the story. It was easier for them to produce a metaphoric ending when they were not restricted by the story context. If one assumes that context should always facilitate comprehension, then there must be something wrong with the story contexts created. Perhaps they were too short, too complex, or not clearly related to the metaphors. Alternatively, context may have variable effects on the comprehension or use of figurative expressions. For example, familiar frozen metaphors should be understood regardless of the context. Some novel metaphors or unfamiliar frozen ones may prove too difficult

to understand even if they are clearly embedded in a supportive context. What this study showed was that merely providing a story context does not facilitate metaphor comprehension and, in some cases (preference task), may actually lead to poorer performance. Metaphors may need to be embedded in stories in order to facilitate comprehension.

The significant negative relationship found between degree of hearing loss and metaphor performance supports the traditional wisdom that the greater the hearing loss, the poorer the language performance. The individual subject data indicate that the two students with the lowest SRTs performed the worst on the metaphor tasks. It may be that children with hearing levels above 50–55 dB have a much greater risk for language problems than children whose hearing levels are below these thresholds. The majority of students (9) had SRTs between 25 dB and 35 dB. No consistent pattern of metaphor performance was found for these students. One must remember also that as a group, the HI students performed comparably to the NH children on all the metaphor tasks. In fact, one NH student had a lower composite metaphor score than any of the HI students.

The finding that degree of hearing loss was significantly related to metaphor performance suggests that there might be a significant relationship between hearing loss and other measures of language in this group. But, degree of hearing loss was significantly related to only one of the four other measures of language, the CELF-R Word Classes subtest ($r = -.73, p < .05$). No significant relationship was found with the PPVT-R or the other two subtests of the CELF-R. It is unclear why degree of hearing loss was related to some language measures and not others.

The significant relationship between degree of hearing loss, metaphor performance, and one measure of language, even if it was caused by scores of a few children, is still inconsistent with a growing number of studies that have not found a significant relationship between degree of hearing loss and various measures of language performance (Davis et al., 1986; Gilbertson & Kamhi, 1995). It seems likely that this inconsistency is due to the use of only the HI group of children with normal language abilities in the present study. Previous studies did not restrict the HI group to those children with normal language abilities. Therefore, these studies had many HI children who performed below age limits on measures of language.

The inclusion of this lower functioning subgroup of HI children clearly affects the relationship between degree of hearing loss and language performance. In the studies by Davis et al. (1986) and Gilbertson and Kamhi (1995), the range of hearing loss of the lower functioning HI group was comparable to the range of hearing loss in the higher functioning HI group. The lower functioning HI group did not, however, perform as well as the higher functioning HI group on the various measures of language in these studies, so the relationship between degree of hearing loss and language was not significant. If we had included a lower functioning subgroup of HI children in the present study, the relationship between degree of hearing loss and performance on the verbal metaphor tasks probably would not have been significant.

Some practitioners and theorists may be uncomfortable with studies that find no relationship between degree of hearing loss and measures of language and our attempt to minimize the importance of the significant relationships found in the present study. It is probably worthwhile to acknowledge that general statements regarding the relationship between degree of hearing loss and language may be overly simplistic. Hearing loss is clearly a risk factor for language problems.

As noted in Gilbertson and Kamhi (1995) and in this study, at least half of the children with mild-to-moderate HI do, in fact, have measurable language deficits. These deficits, however, may be caused by the same processing limitations that underlie language impairments in NH children. Thus, hearing loss may not be a direct cause of the language impairment, but HI children may be more likely than NH children to have concomitant deficiencies in basic linguistic and cognitive mechanisms. Future studies should look more closely at some of these issues and further examine the relationship between degree of hearing loss and language abilities in the lower and higher functioning subgroups of HI children.

CONCLUSION

The findings of the present study indicate that HI children who perform within normal age limits on standardized measures of language also perform comparably to their age peers on measures of metaphor competence. These findings add to a growing body of literature showing that a significant number of children with mild-to-moderate HI have language abilities that appear to be developing normally. Despite this growing body of literature, it is difficult to overcome the long-standing belief that all HI children have some degree of language impairment. Some of these children may, in fact, have problems in other aspects of language, such as conversational/narrative discourse, reading, or writing. However, as Gilbertson and Kamhi (1995) recently noted, there is no reason to expect that HI children who perform within normal age limits on certain measures of language should be any more homogeneous than a group of normally developing children without a hearing loss. Just as normally developing children have academic, social, and language strengths and weaknesses, HI children will have strengths and weaknesses in these areas. The findings of this study emphasize the need to differentially diagnose this population, paying particular attention to language performance.

Although some HI children may appear to exhibit normal language abilities, they may have to work harder to achieve their “normal” language performance. Even though these children may perform within normal age limits on measures of spoken language, they may still need intervention for other aspects of language (e.g., written language, narrative discourse, interpersonal communication). Speech-language pathologists should collaborate with classroom teachers to continue to monitor students’ progress in the social, language, and academic domains. In addition,

clinicians and educators need to ensure that performance expectations for students with HI are the same as those for NH children. If these children are always expected to have language and learning difficulties, they may live down to those expectations. Misconceptions regarding the effects of a mild-to-moderate hearing loss thus may have more of an adverse effect on language and learning than the hearing loss itself.

ACKNOWLEDGMENT

The Chief, Bureau of Medicine and Surgery, Navy Department, Washington, D.C., Clinical Investigation Program sponsored this case report #84-16-1968-590, as required by HSETCINST 6000.41A. The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Navy, the Department of Defense, or the United States Government.

REFERENCES

- Ackerman, B.** (1982). On comprehending idioms: Do children get the picture? *Journal of Experimental Psychology*, *33*, 439–454.
- American Speech-Language-Hearing Association.** (1985). Committee on Audiologic Evaluation: Guidelines for identification audiometry. *ASHA*, *27*, 49–52.
- Brown, L., Sherbenou, R., & Johnsen, S.** (1990). *Test of Nonverbal Intelligence-2*. Austin, TX: Pro-Ed.
- Davis, J., Elfenbein, J., Schum, R., & Bentler, R.** (1986). Effects of mild and moderate hearing impairments on language, educational, and psychosocial behavior of children. *Journal of Speech and Hearing Disorders*, *51*, 53–62.
- Dunn, L., & Dunn, L.** (1981). *Peabody Picture Vocabulary Test-Revised*. Circle Pines, MN: American Guidance Services.
- Fruchter, A., Wilbur, R., & Fraser, B.** (1984). Comprehension of idioms by hearing-impaired students. *Volta Review*, *86*, 7–19.
- Fry, E.** (1977). *Elementary reading instruction*. New York: McGraw-Hill.
- Gardner, M.** (1990). *Expressive One Word Picture Vocabulary Test-Revised*. Novato, CA: Academic Therapy Publications.
- Gilbertson, M., & Kamhi, A.** (1995). Novel word learning in children with hearing-impairment. *Journal of Speech and Hearing Research*, *38*, 630–641.
- Iran-Nejad, A., Ortony, A., & Rittenhouse, R.** (1981). The comprehension of metaphorical uses of English by deaf children. *Journal of Speech and Hearing Research*, *24*, 551–556.
- Kogan, N., Connor, K., Gross, A., & Fava, D.** (1980). Understanding visual metaphor: Developmental and individual differences. *Monographs for the Society for Research in Child Development*, *45*(1, Serial No. 183).
- Lee, R., & Kamhi, A.** (1990). Metaphoric competence in children with learning disabilities. *Journal of Learning Disabilities*, *23*, 476–482.
- Nam, C., LaRocque, J., Powers, M., & Holmberg, J.** (1975). Occupational status scores: Stability and change. *Proceedings of the American Statistical Association* (pp. 570–575). Houston, TX: Cap & Gown.
- Nippold, M., & Rudzinski, M.** (1993). Familiarity and transparency in idiom explanation: A developmental study of children and adolescents. *Journal of Speech and Hearing Research*, *36*, 728–737.
- Ortony, A., Schallert, D., Reynolds, R., & Antos, S.** (1978). Interpreting metaphors and idioms: Some effects of context on comprehension. *Journal of Verbal Learning and Verbal Behavior*, *17*, 465–477.
- Pollio, M., & Pickens, J.** (1980). The developmental structure of figurative competence. In R. Honeck & R. Hoffman (Eds.), *Cognition and figurative language* (pp. 311–340). Hillsdale, NJ: Erlbaum.
- Pollio, M., & Pollio, H.** (1974). The development of figurative language in children. *Journal of Psycholinguistic Research*, *3*, 185–201.
- Pollio, M., & Pollio, H.** (1979). A test of metaphoric comprehension and some preliminary data. *Journal of Child Language*, *6*, 111–120.
- Rittenhouse, R., & Kenyon, P.** (1991). Conservation and metaphor acquisition in hearing-impaired children. *American Annals of the Deaf*, *136*, 313–320.
- Rittenhouse, R., Morreau, L., & Iran-Nejad, A.** (1981). Metaphor and conservation in deaf and hard-of-hearing children. *American Annals of the Deaf*, *126*, 450–453.
- Rittenhouse, R., & Stearns, K.** (1982). Teaching metaphor to deaf children. *American Annals of the Deaf*, *127*, 12–17.
- Rittenhouse, R., & Stearns, K.** (1990). Figurative language and reading comprehension in American deaf and hard-of-hearing children: Textual interactions. *British Journal of Disorders of Communication*, *25*, 369–374.
- Schaefer, C.** (1971). *Similes test manual*. New York: Research Psychologists Press.
- Semel, E., Wiig, E., & Secord, W.** (1987). *Clinical Evaluation of Language Fundamentals-Revised*. New York: Harcourt Brace Jovanovich.
- Sikora, D., & Plapinger, D.** (1994). Using standardized psychometric tests to identify learning disabilities in students with sensorineural hearing impairments. *Journal of Learning Disabilities*, *27*, 352–359.
- Silberstein, L., Gardner, H., Phelps, E., & Winner, E.** (1982). Autumn leaves and old photographs: The development of metaphor preferences. *Journal of Experimental Psychology*, *34*, 135–150.
- Werner, E., & Kresheck, J.** (1983). *Structured Photographic Expressive Language Test-II*. Sandwich, IL: Janelle Publications.

Received June 10, 1996

Accepted April 28, 1998

Contact author: LCDR Keith S. Wolgemuth, PhD, c/o Clinical Investigation Department, Naval Medical Center, 34800 Bob Wilson Drive, San Diego, CA 92134-5000.

APPENDIX A. METAPHOR COMPREHENSION TASK

Task Instructions

I am going to read to you some short sentences. I want you to follow along with me on your paper. If you will look at your paper, you will see a part of the sentence has been underlined. Under this sentence, there are four possible answers. I want you to choose the answer that best tells what the person who wrote the sentence wanted to say.

1. From space, the earth looks like a little round ball with freckles and paint on it.
 - a. From space, the round earth looks like it has little colored spots on it.
 - b. Planets have freckles just like people.
 - c. From space, you can see earth spots as well as sun spots.
 - d. The earth has been in the sun so long, it has freckles.
2. Suddenly I saw a ghost. I felt like running, but my courage took over my fear.
 - a. I was too scared to move.
 - b. My heart was stronger than my mind.
 - c. I was brave, and that kept me from running.
 - d. I decided that it was stupid to be afraid.
3. The boy was as quiet as a mouse.
 - a. The boy was gray and furry, and had pink ears.
 - b. The boy scurried around the room.
 - c. The boy was very, very quiet.
 - d. The person who said it was only kidding, because boys are not mice.
4. Trees decorate things.
 - a. Trees make the earth look like it was painted green.
 - b. You can make decorations from wood.
 - c. When trees drop their leaves, they ornament the ground.
 - d. Trees make the land look beautiful.
5. In summer, you can feel the sunbeams.
 - a. It really hurts when you get sunburned.
 - b. In the summer, the sun shines brightly and makes your skin feel very warm.
 - c. When it is hot, the sun presses down hard on you.
 - d. In summer, you can grow beans, because the sun shines so brightly.
6. John went for a walk in the woods. The woods were dark and scary. The trees were tall with long, black branches. John heard a strange noise behind him. When he looked around, the trees looked down on him in a spooky old way.
 - a. The trees had knot holes that looked like eyes.
 - b. The trees scared the boy.
 - c. The trees bent in the wind.
 - d. There were ghosts in the trees.
7. I heard the news on the radio. Somebody said the trees had disappeared from the mayor's backyard. Since I was a detective, I decided to look into the matter. I started on the case. The yard looked bare to me.
 - a. I cased the joint to find the crook.
 - b. I opened the case that held my magnifying glass.
 - c. I was sad when I learned that the trees had disappeared, so I started drinking a case of beer.
 - d. I began to study the problem of the missing trees.
8. Whatever summer is, we know when it's here, for things tell us so.
 - a. Somebody said it was summer.
 - b. The paper announced the first day of summer.
 - c. One can look at nature, and tell by the changes that summer is here.
 - d. If you listen carefully, you know summer is here.
9. The little boy was flying on an airplane for the first time. The plane started to go up into the sky. The boy looked out the airplane window. The ground was getting farther and farther away. The cars on the highway became smaller. Then, the trees disappeared like melting ice cream.
 - a. The trees lost their shape and disappeared slowly.
 - b. Trees look a lot like ice cream cones.
 - c. It was very hot, and the trees started melting.
 - d. The trees melted and dripped down the trunk.

10. In the summer, you smell clean, fresh air, and you feel like you are starting a whole new world.
- Summertime makes you feel like you want to go on vacation in some faraway place.
 - In summertime, most of the worn parts of the earth are replaced.
 - In the summer, everything looks fresh and alive and it's a great change from winter.
 - Summertime makes you feel uncertain of yourself.
11. I love the circus. Each spring it comes to our town. There's always a big parade with lots of animals and clowns. Sometimes they pick children to help the clowns with their tricks. One clown chose me. I was so excited, I couldn't stand it.
- I was extremely excited.
 - I fell down, I was so excited.
 - I was so excited, I jumped up and down.
 - I was excited, and I don't like being excited.
12. Mary and Joe were in their backyard. It was the first time they were able to play outside for several days. Joe said he couldn't wait for summer so they could play outside all the time. Mary looked at the sky. The girl said, "You can smell the fresh air and flowers." You can taste the coming of summer.
- People wear fashionable clothes at the beginning of summer.
 - She was describing how strongly the summer air affected her senses.
 - She likes to eat in the summertime.
 - The flowers reminded her of something she'd like to eat.
13. Joe didn't like to work. He never finished his chores at home. His mother often told him to clean his room and empty the trash. One day, Joe and his mother went shopping. Joe saw a new bike he really wanted. His mother said if he didn't do his work, he would never have a new bike. When Joe got home, he turned over a new leaf. He was never lazy again.
- Joe began raking the leaves that had just fallen.
 - Because it was spring, he felt more energetic.
 - Joe changed his habits.
 - Joe began a new page in his favorite book.
14. I was tired and went to bed early. I was sleeping when suddenly I heard a loud crash. I ran to the door to see what was going on. I saw a bright light and blue smoke. There was a spaceship in the front yard. I looked closer. I couldn't believe my eyes. There were little green men with antennae poking out of their heads all over the place.
- I don't believe in little green men.
 - The appearance of the little green men was very surprising.
 - Sometimes you see things that aren't really there.
 - My eyes were lying to me.
15. I went into the kitchen and ate up a storm.
- I ate a lot.
 - I drank some white lightning from the refrigerator.
 - I ate so much it rained.
 - I like to eat when it's raining.
16. I went walking through the house looking for the living room. The house was dark and gloomy. At last, I found the living room and opened the door. In the corner, I saw a coffin. I was scared. I walked slowly toward the coffin. I was amazed my feet were brave enough to take me there.
- I did not think I would have the courage to do it.
 - My new sneakers made me feel I could do anything.
 - My feet have a mind of their own.
 - Somehow I was pulled to the coffin against my will.

APPENDIX B. METAPHOR PREFERENCE TASK

Task Instructions

I want you to look at and listen to some poems. Tell me what is a poem? (Examples of poems are provided, both those that rhyme and those that compare dissimilar objects). Poems often have interesting and different names for things. I want to find out what kinds of poems people like best. You will find some poems on your paper. These poems do not have endings. I want you to pick the ending you like best. Some poems will have stories. Your job for all the poems is to pick the ending you like best. Pick the ending you think makes the best poem. Let's look at a poem together.

1. The hunter was hunting for deer in the tall grass. He was in a part of the woods he had never been before. He was walking very slowly. His foot became tangled in a vine, and he couldn't move. Suddenly he heard a noise behind him. He turned and saw a rattlesnake in the grass. The rattlesnake was...
 - a. a long rope
 - b. soap sliding along the bathtub
 - c. a hissing kettle
 - d. a storm cloud
 - e. an animal in the grass
2. The painter's first stripe of white paint on the old grey wall is...
 - a. a slurp of soup
 - b. salt
 - c. long hair being brushed
 - d. new paint
 - e. sunshine after a rainy day
3. Mrs. Jones had a beautiful rose garden. She spent everyday in the garden taking care of her treasured roses. She watered them when the weather was dry and sprayed weekly for bugs. She had many colors of roses in her garden, but the red ones were her favorite. When the red roses began to bloom, she would spend hours looking at them. A red rose bud is...
 - a. cherry cough syrup
 - b. a much loved child
 - c. a sock wadded up
 - d. a beautiful flower
 - e. a slowly opening fist
4. The cars on the freeway were not moving. They were lined up for several miles. Every once and awhile the cars would slowly move forward and then stop again. Mr. Jones was late for work. He sat in his car and waited for the traffic to move. He became mad and honked his horn loudly. A traffic jam is...
 - a. many cars in one place
 - b. a barnyard of noisy animals
 - c. getting your jacket zipper stuck halfway
 - d. dominoes in a row
 - e. a creeping caterpillar
5. A wave in the ocean is...
 - a. a curl of hair
 - b. a burst of energy in a tired runner
 - c. a stack of dishes crashing
 - d. a lion springing in attack
 - e. water that goes up and down
6. Jim got a balloon at his friend's birthday party. The balloon was round and red. Jim dropped the balloon on a pile of sharp rocks. One of the rocks tore a big hole in the balloon and all the air came out. A popped red balloon is...
 - a. a limp washcloth
 - b. a bottle of ketchup
 - c. a washed away sandcastle
 - d. an empty auditorium after a concert
 - e. a broken toy
7. Night filling the sky is...
 - a. coal
 - b. a silent piano
 - c. a forgotten thought starting to return
 - d. a gigantic puddle
 - e. slowly increasing darkness

8. The record playing softly on the phonograph is...
- a quiet song
 - a purring kitten
 - a summer breeze
 - a Frisbee
 - ink
9. The city zoo has five grey elephants. They all do tricks. They can stand on their hind legs and walk around in circles. When they do a trick, the zookeeper gives them peanuts. After they eat the peanuts, they put their trunks up and make loud noises. The elephant's trunk being raised is...
- old silverware
 - a honking car
 - a question mark
 - a flag going up a pole
 - a long nose
10. After a week of clouds, the sun was...
- a baby playing peek-a-boo
 - a beachball
 - orange juice
 - shining in the sky
 - a birthday party
11. It was a quiet, winter afternoon. The streets and sidewalks were covered with snow. Tom sat and watched the snow falling outside his bedroom window. The snowflakes dropped one by one from the sky. One dropped on Tom's window. Tom looked at it closely. A snowflake is...
- a gentle kiss
 - a twirling ballerina
 - frozen rain
 - a silent street
 - a paper airplane
12. A hatching chick is...
- a newborn chicken
 - a bright lemon
 - a kernel of popcorn popping
 - tapping fingernails on a door
 - a child let out for recess
13. Sue's ice cream shop makes the best sundaes in town. They use mounds of creamy ice cream and lots of hot fudge. They put on lots of whipped cream and chopped nuts. People come from all over the county to eat Sue's sundaes. A chocolate sundae is...
- skiers moving slowly down slopes
 - getting to stay up past your bedtime
 - fudge sauce on vanilla ice cream
 - a zebra
 - a big hill
14. The sun going down behind the hill is...
- the end of a long story
 - an ice cube melting
 - daylight becoming night
 - a nickel in the parking meter
 - a hushed library
15. The sails on the riverboats are...
- shark fins
 - pieces of chalk
 - pages being noisily turned
 - rollerskaters going by
 - sheets of cloth
16. Jeff ran home from school. He was hungry after a long, hard day. He wanted something good to eat. Jeff looked around the kitchen and saw a bunch of ripe bananas. Jeff tore a banana off the bunch and began to peel it. The peeling banana is...
- cloth tearing
 - a piece of fruit
 - a person undressing
 - buttered popcorn
 - a sliver of moon

APPENDIX C. METAPHOR COMPLETION TASK

Task Instructions

I would like you to make up some short endings to poems. I will read to you some very short poems. These poems do not have an ending. I want you to make up an ending for each poem. Some poems will have short stories and some will not. Your job for all the poems is to make up the best ending you can for each poem. Try to make the best poem you can. Let's do a poem together.

1. Timmy wanted a bicycle more than anything else in the world. He had already picked one out at the toy store. It was blue with red stripes. Timmy showed the bike to his mother. He wanted it for his birthday. When he woke up on his birthday, the bike was in the living room. Timmy was as happy as...
2. The teddy bear was as soft as...
3. No one liked Mr. Jones. He always walked around with a frown on his face and never talked to anyone. Sometimes he would yell at the children in the street. He would tell them to go away and leave him alone. He even made some of them cry. Mr. Jones was as mean as...
4. It was Saturday night, and there was a monster movie on T.V. Jane watched the movie with her brother. The movie was about witches and vampires. Every time something scary happened, there was spooky music. At one point, a vampire came out of his coffin, and the music began to play. The little girl trembled, she was as scared as...
5. The old car was as noisy as...
6. Mr. Jones was the fattest man in town. Once he had an accident, and it took five men to carry him to the ambulance. His waist was 60 inches around, and his pants had enough room for two grown men. Children made tents out of his shirts and used his belts for jump ropes. Mr. Jones was as fat as...
7. The night was as dark as...
8. Mrs. Lewis was 92 years old. Her hair was snowy white and her face was lined and wrinkled. Her fingers were gnarled and bent. Mrs. Lewis walked with a limp and used a cane. She tired easily and often had to stop and rest. She always wore thick, round eyeglasses. Mrs. Lewis was as old as...
9. The wind sounded as angry as...
10. The boy was as sad as...
11. The stars were as bright as...
12. It was a beautiful day at the beach. The sun was shining brightly and there was a gentle breeze. The water was still and quiet. The waves barely made a sound as they reached the shore. Boats glided easily on the water. The ocean was as calm as...
13. The summer's day was as hot as...
14. It was springtime, and the flowers were in bloom. The air was filled with the fragrance of roses and daffodils. Sue picked a bouquet of fresh flowers for her room. Soon the room had the beautiful scent of the flowers. The flowers smelled as sweet as...
15. The puppy jumped around as excited as...
16. Mr. Smith always wore a hat. In the summer, he wore a straw hat in the garden and a felt hat to work. In the winter, he wore a wool hat with ear flaps. Everyone wondered why Mr. Smith always had a hat on. Then one day, the wind blew his hat off his head. Everyone looked at Mr. Smith's head. He was as bald as...

APPENDIX D. METAPHOR TRIAD TASK (KOGAN ET AL., 1980)

Task Instructions

I want to see what kind of thinking you do about pictures. Do you see these pictures (the examiner points to all three pictures)? I want you to show me which of the top pictures would make a good pair with the bottom picture because they are alike in some way.

Which pictures go together best?

1. violin*, singing canary*, tree
2. fish, winding river*, snake*
3. man in the rain, thunderstorm*, angry man*
4. wilted plant*, hot tired runner*, glass of water
5. spinning top*, girl playing, dancing ballerina*
6. ancient tree*, rocking chair, a grandfather*
7. broken down house*, moldy swiss cheese*, rat
8. rifle, marching men*, flock of birds*
9. house with shades pulled down*, bed, woman with closed eyes*
10. worn-out woman*, grazing goat, barren landscape*
11. snorting bull*, boxer*, leather gloves
12. ocean, plane on fire*, fish on hook*
13. old man*, candle nearly burned down*, smoking pipe
14. woman with jewels*, city street, city lit up at night*
15. rose bud*, baby*, watering can
16. drowsy person*, “droopy” house*, living room
17. foggy street corner*, veiled woman*, moving car
18. weeping willow*, park bench, sad woman*
19. car, car wheel*, traffic circle*
20. rooster crowing*, barnyard, farmer showing muscles*
21. girl, melting snowman*, waves running into sandcastle*
22. wilted flowers*, old woman sick in bed*, vase on table
23. compass showing directions, thirsty man finds oasis in desert*, ship in storm guided by lighthouse beam*
24. watering can, woman with long hair*, hanging plant*
25. cracks in ice near skating boy*, boy with beehive overhead*, fishing rod
26. fly in spider’s web*, fishing boat, fish caught in net*
27. ambulance, explosion*, man in a rage*
28. sunflower*, greenhouse, tall thin woman*
29. blind man at the top of stairs*, German shepherd dog, ship navigating through rocks*

* Indicates member of metaphor pair

APPENDIX E. INDIVIDUAL SUBJECT CHARACTERISTICS AND STANDARDIZED TEST RESULTS

<i>Subject</i>	<i>Age</i>	<i>Race</i>	<i>SRT</i>	<i>PPVT-R</i>	<i>TONI quotient</i>	<i>Gender</i>
HI01	15:01	C	55	89	85	F
HI02	12:02	C	10	98	103	F
HI03	13:03	C	30	77	104	F
HI04	14:06	C	30	127	116	M
HI05	13:09	C	35	95	102	F
HI06	14:07	C	5	106	86	F
HI07	15:07	C	55	84	95	F
HI08	11:02	C	35	82	100	M
HI09	11:00	AA	30	88	95	M
HI10	11:06	C	30	103	93	F
HI11	13:06	AA	35	95	101	F
HI12	12:10	AA	25	85	100	M
HI13	14:02	AA	35	107	100	M
NH01	13:09	C	N/A	111	104	F
NH02	11:10	C	N/A	101	93	F
NH03	11:08	C	N/A	116	109	F
NH04	12:10	C	N/A	102	97	M
NH05	14:04	C	N/A	107	122	F
NH06	13:09	C	N/A	100	110	F
NH07	12:00	AA	N/A	87	98	M
NH08	11:11	C	N/A	106	101	F
NH09	11:07	C	N/A	114	109	M
NH10	13:08	AA	N/A	82	101	F
NH11	10:00	C	N/A	105	108	M
NH12	13:10	AA	N/A	109	95	M

Note. SRT = speech reception threshold, PPVT-R = Peabody Picture Vocabulary Test-Revised, TONI = Test of Nonverbal Intelligence, C = Caucasian, AA = African American.

CELF-R SUBTESTS

<i>Subject</i>	<i>Word Classes</i>	<i>Oral Directions</i>	<i>Listening to Paragraphs</i>
HI01	5	5	12
HI02	12	8	15
HI03	7	8	11
HI04	10	14	15
HI05	8	14	10
HI06	14	10	15
HI07	8	4	15
HI08	13	4	8
HI09	9	8	8
HI10	8	5	6
HI11	8	14	15
HI12	10	5	10
HI13	10	8	8
NH01	12	10	15
NH02	9	7	14
NH03	12	11	14
NH04	9	14	13
NH05	14	10	15
NH06	10	8	12
NH07	10	4	9
NH08	11	8	11
NH09	17	6	8
NH10	8	8	9
NH11	10	6	9
NH12	10	5	11

Note. CELF-R = Clinical Evaluation of Language Fundamentals-Revised.

APPENDIX F. INDIVIDUAL SUBJECT VERBAL AND NONVERBAL METAPHOR TASK RESULTS

<i>Subject</i>	<i>Comprehension</i>			<i>Preference</i>		
	<i>Total</i>	<i>W/Context</i>	<i>W/O Context</i>	<i>Total</i>	<i>W/Context</i>	<i>W/O</i>
HI01	13	6	7	31	15	16
HI02	16	8	8	40	17	23
HI03	14	7	7	25	13	12
HI04	15	7	8	34	13	21
HI05	14	7	7	38	19	19
HI06	14	7	7	36	16	20
HI07	12	5	7	22	15	7
HI08	15	8	7	26	12	14
HI09	10	3	7	42	21	21
HI10	13	6	7	27	15	12
HI11	15	8	7	36	18	18
HI12	15	7	8	27	13	14
HI13	11	4	7	37	16	21
NH01	16	8	8	37	17	20
NH02	14	8	6	34	16	18
NH03	16	8	8	38	17	21
NH04	13	6	7	30	13	17
NH05	15	7	8	33	18	15
NH06	15	8	7	32	14	18
NH07	11	6	5	28	16	12
NH08	14	7	7	30	16	14
NH09	14	6	8	40	18	22
NH10	16	8	8	38	17	21
NH11	14	7	7	32	15	17
NH12	16	8	8	35	16	19

Note. W/Context represents task scores for the supportive linguistic context condition, W/O Context represents task scores without supportive linguistic context.

<i>Subject</i>	<i>Metaphor completion</i>			<i>MTT</i>	<i>Familiarity</i>
	<i>Total</i>	<i>W/Context</i>	<i>W/O Context</i>	<i>Total</i>	<i>Mean</i>
HI01	21	9	12	14	1.8
HI02	26	12	14	20	3.5
HI03	27	11	16	8	2.9
HI04	33	17	16	25	3.1
HI05	30	15	15	32	2.8
HI06	39	19	20	20	3.6
HI07	28	15	13	16	2.6
HI08	31	13	18	12	4.3
HI09	37	18	19	10	3.1
HI10	36	17	19	6	2.7
HI11	38	18	20	13	3.7
HI12	33	15	18	3	3.3
HI13	42	19	23	18	1.6
NH01	31	13	18	31	2.4
NH02	31	16	15	24	3.6
NH03	27	10	17	28	3.1
NH04	37	18	19	21	3.5
NH05	35	18	17	17	3.1
NH06	39	19	20	31	3.9
NH07	20	10	10	6	3.2
NH08	38	18	20	19	3.6
NH09	35	17	18	24	2.9
NH10	41	20	21	8	3.4
NH11	35	20	15	9	4.1
NH12	37	18	19	10	2.6

Note. MTT = Metaphor Triads Task, W/Context represents task scores for the supportive linguistic context condition, W/O Context represents task scores without supportive linguistic context.