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An analysis of the semantic skills of children who are deaf or hard of hearing

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AN ANALYSIS OF THE SEMANTIC SKILLS OF CHILDREN WHO ARE DEAF OR HARD OF HEARING

By

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Abstract: Ten children who were deaf or hard of hearing were administered the Test of Semantic Skills - Primary. The results indicate that semantic skills of children who are deaf or hard of hearing are not dependent on category type or receptive or expressive abilities.

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INTRODUCTION

It is well recognized that children with hearing loss may have significant delays and difficulties in the areas of speech and language development, communication, and learning (Svirsky, Robbins, Kirk, Pisoni, & Miyamoto, 2000). Delays in the development of their receptive and expressive communication skills often result in reduced academic achievement. Communication difficulties also can lead to social isolation and poor self-concept (Svirsky, Robbins, Kirk, Pisoni, & Miyamoto, 2000). Recent research indicates that children diagnosed with a hearing loss who begin appropriate services early may be able to develop language on par with their normal-hearing peers (Svirsky, Robbins, Kirk, Pisoni, & Miyamoto, 2000).

When evaluating the language of preschool and school-aged children with language impairments, speech/language pathologists typically assess a variety of skill areas. These may include semantics, syntax, phonology, and pragmatics (Brackenbury & Pye, 2005). These evaluations are very important as they are used to determine a child's eligibility for language intervention, the course and goals of therapy, and his/her classroom environment. Because so much is at stake, it is critical that language evaluations be complete and thorough (Brackenbury & Pye, 2005). Unfortunately, assessment in the area of semantics is often limited to measures of single-word receptive and expressive vocabulary. Tests such as The Peabody Picture Vocabulary Test and the Expressive Vocabulary Test are often the only ones administered during language evaluations (Brackenbury & Pye, 2005). Although these tests provide useful information about a child's ability to identify a spoken word from a choice of four pictures and the child's ability to label when shown a picture, they do not provide much information about the child's overall semantic skills. As a result, the child's semantic deficits may not receive the attention they need (Brackenbury & Pye, 2005).

Semantics refers to the meaning of language. It is more specifically associated with vocabulary size, and the ability to understand and use spoken and written language (Newmonic, 2011). Children with larger vocabularies, who can define the words they know, have an easier time understanding and using language. Semantics can be broken down into 5 different word categories that help explain the components that go into deriving meaning from language (Newmonic, 2011). Concept words are category words such as *fruit* which encompasses *apple, banana, grapes* etc. Content words are the different parts of speech, for example verbs, nouns and adjectives. Synonyms are words that have similar meanings such as *benefit* and *profit.* Antonyms are words that have opposite meanings such as *truthful* and *deceitful*. Lastly homophones are words that sound alike but have different spelling and meanings, for example *blue* and *blew*. (Newmonic, 2011).

Acquiring new language is a complex process but for many children is an automatic one. Children who have normal hearing acquire language by overhearing it and are able to grasp the context in which it is used (Newmonic, 2011). For example, research has shown us that children between 18 months until they are 18 years old learn about 10 new words per day (Brackenbury & Pye, 2005). This number is much greater than words they are specifically taught, proving what we know about children's ability to learn words in-explicitly (Brackenbury & Pye, 2005). Since we know that deaf and hard of hearing children have a more difficult time overhearing words it is crucial to find out how much they are missing. If we want to fill in the gaps and strengthen these children's understanding and use of language we first must find a way to identify their strengths and weaknesses.

LITERATURE REVIEW

In the study, The Application of Taxonomic Knowledge by Deaf Students, organization techniques of a deaf child's mental lexicon were explored (Marschark, Convertino & Masteller,2004). In the first experiment deaf children were compared to UFS Word Association Norms to see how they compared in a word association task. Single word associations were collected from a set of superordinates, which are category names, and subordinates, which are category members. For example, Fruit =_____ (*banana*) is a superordinate and Banana = _____ (*fruit*) is a subordinate category (Marschark, Convertino & Masteller, 2004). It was hypothesized that deaf students would show more variability in their answers and were less likely to respond correctly to category names to exemplars. The tests administered were both signed and spoken to a group of 131 college students who are deaf or hard of hearing. The results indicated that students with hearing loss gave more varied answers than their hearing peers. The participants with hearing loss also showed a weaker link between categories and their exemplars. Unlike their hearing peers, the deaf students demonstrated stronger links between members of categories and the category (Marschark, Convertino & Masteller, 2004).

The second experiment in The Application of Taxonomic Knowledge by Deaf Students was a verbal analogy task (Marschark, Convertino & Masteller, 2004). The participants included 18 college students who were deaf or hard of hearing and 21 college students with typical hearing. They were asked to complete 48 analogies with six different categories including superordinate: *table* - *furniture*, subordinate: *animal* - *dog*, coordinate: *minivan* - *sedan*, rhyme: *same* - *came*, predication: *turtle* - *slow* and part-whole / whole-part: *monkey* - *tail*. The results showed that hearing peers performed better on each type of analogy (Marschark, Convertino & Masteller, 2004). The difference in performance from greatest to least was rhyme, coordinate, superordinate, part - whole, predication then subordinate. Difficulties in rhyme were not the main

focus of the researchers because they believe that it does not affect reasoning skills. They did find the results of the coordinate analogies to help prove their hypothesis that deaf students would be less likely to use taxonomic clustering. The results also backed up the first experiments results supporting the idea that students who are deaf have more success completing subordinate tasks (Marschark, Convertino & Masteller, 2004).

Semantic Categorization: A comparison between deaf and hearing describes two experiments that compared how deaf children and hearing children differ in their semantic abilities (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven, 2010). The first experiment was designed to test the semantic categorization of exemplars, such as *dogs* and *cats* are both *animals*. The stimuli were presented in written and picture form to see how much reading difficulties would account for missed questions. The children who were deaf were predicted to underperform in the written test and come closer to filling the gap on the test with pictures. Fifty-nine deaf and hard of hearing children with both bilingual and signing backgrounds were the participants in this experiment (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven, 2010). They presented four pictures or words that represented possible answers. The participants were asked to choose between the four possibilities. The results of the first experiment proved the hypothesis to be accurate. The hearing children showed much greater accuracy in both the written and picture tests, but there was slightly less of a gap between hearing and deaf participants in the picture test (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven, 2010).

The second experiment from this study tested deaf children's knowledge on superordinates (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven, 2010). Superordinate categories included *residence, toys, jobs, transport, sports, pets, fruit, furniture, vegetables, mammals, numbers* and *clothes* (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven,

2010). The participants were the same used in the first experiment. The superordinate categories were presented as written words alongside four pictures of possible responses. As hypothesized, hearing children scored significantly higher in their knowledge of superordinate categories (Ormel, Gijsel, Hermans, Bossman, Knoors & Verhoeven, 2010).

TOSS - P

It has been shown that children who are deaf or hard of hearing display delays in semantic abilities. Without a complete understanding of their deficits, it is impossible to determine a proper course of action to improve their semantic abilities. Staff at The Moog Center for Deaf Education in St. Louis Missouri wanted to administer a test other than the Peabody Picture Vocabulary Test and the Expressive Vocabulary Test to help further examine their students' semantic abilities. Competent semantic skills require more than simply pointing to a named picture or labeling pictures as they are presented.

Test of Semantic Skills Primary (TOSS - P) was administered to ten children who are deaf or hard of hearing while they attended the Moog Center. These children, between the ages of four and eight years, use spoken language as their primary form of communication and also receive benefit from hearing aids and/or cochlear implants. The TOSS-P is a receptive and expressive diagnostic text designed to assess the semantic skills of children between four and eight years of age who have a language disability (Bowers, LoGuidice, Huisingh & Orman, 2002). The test consists of twenty realistic line- illustrations that revolve around six themes that represent scenes from a child's everyday life such as: *Learning a*nd *playing*, *Shopping, Around the House, Working at School, Eating,* and *Health* and *Fitness.* These themes were chosen because they are familiar and important to children who are in preschool and early elementary grades. There are five receptive and five expressive subtests (Bowers, LoGuidice, Huisingh &

Orman, 2002). Responses are elicited by questions or directions from the examiner that refer to illustrations in the Picture Stimuli Book. There are no basal or ceilings and children are given a score of 1 or 0 according to the appropriateness of their responses. Acceptable responses are listed in the italics on the test form (Bowers, LoGuidice, Huisingh & Orman, 2002).

The test provides standardized information for the receptive and expressive semantic and vocabulary tasks described below (Bowers, LoGuidice, Huisingh & Orman, 2002).

Identifying Labels

This subtest requires the child to point to an in an illustration when named by the examiner. (e.g. "Show me a boy's elbow.")

Identifying Categories

This subtest requires the child to point to a representative member of a category named by the examiner. (e.g. "Show me a vehicle.")

Identifying Attributes

This subtest requires the child to point to an item after the examiner states one of its attributes such as a shape or parts. (e.g. "Point to something with a nozzle.")

Identifying Functions

This subtest requires the child to point to an item whose function has been described by the examiner. (e.g. "Show me something that keeps food cold.")

Identifying Definitions

This subtest requires the child to point to an item whose function had been described by the examiner. (e.g. "I see something we put groceries in while we shop. Show it to me.")

Stating Labels

This subtest requires the child to state an item in an illustration when the examiner points to it.

Stating Categories

This subtest requires the child to name a category after the examiner names three members of it. (e.g. “What are these called? 1...4...7”)

Stating Attributes

This subtest requires the child to describe an item in the scene by stating one of its *attributes.* *(e.g. “*How does a slide feel?*”)*

Stating Functions

This subtest requires the child to describe what an item does or what we do with the item after the examiner points to it. (e.g. “This is a tambourine. Tell me how you play it.”)

Stating Definitions

This subtest requires the child to define an item in the scene indicated by the examiner. (e.g. “These children are healthy. Tell me what *healthy* means.”)

Results

The test results that were being evaluated and discussed in this study are the standard scores. Standard scores are used to compare a child’s individual score to the performance of other children his/her age. The average range of scores for the TOSS-P is between 85 and 115, with 100 being the median. There are standard scores that show how well each child did on each individual task and there are also overall receptive and expressive standard scores. Since the children in the normative sample all have normal hearing, an examination of the scores obtained by the children who are deal or hard of hearing will show how their semantic skills compare to the semantic skills of their same-age peers who have normal hearing.

Table 1 shows the five receptive categories and the five expressive categories assessed by the TOSS-P and the results for each category for each of the ten children. It is noteworthy that the results do not follow a pattern, indicating that no one semantic category proved more difficult than another for these children as a whole. Instead, the scores showed that these children have very individual strengths and weakness in their semantic skills. For example, Child 7 is above the average range on *Identifying Labels*, with a standard score of 117, but below the average range on *Identifying Categories*, with a standard score of 59. Child 3 is below the average range on *Identifying Labels*, with a standard score of 59, but within the average range on *Identifying Categories* with a standard score of 99. Child 1 is within the average range for all categories except *Stating Definitions*. This child achieved a score that is below the norms as the numeral was not recorded. Individual scores ranged from more than 2 standard deviations above the mean (Child 7's standard score on *Stating Categories* is 141) to more than 2 standard deviations below the mean (Child 3's standard score on Identifying Labels is 59).

Table 2 shows the overall receptive and expressive total scores for the ten children who were administered the TOSS-P in this study. Children who have normal hearing tend to score similarly on receptive and expressive tasks so you would expect their scores for both parts of the test to be within the same range. This was not the case for all of the children in this study. For example, Child 4 and Child 7 both had Receptive Total standard scores within the average range (104 and 115), but Expressive Total standard scores above the average range (122 and 126). With the exception of Child 1, all of the children had higher Expressive Total standard scores than Receptive Total Stand scores. For these ten children, the average standard score on the receptive portion of the TOSS-P is 91.5; the average score on the expressive portion of the

TOSS- P is 96.7. These results indicate that, overall, these ten children who are deaf or hard of hearing have better expressive semantic skills than receptive semantic skills.

Discussion

This study provided information that was different than anticipated. The TOSS-P was administered to these ten children to see which general areas these children have strengths and weaknesses in their semantic skills. For example, it was assumed that identifying and stating labels would be much easier for these children than the other tasks since they are administered the PPVT and EVT on a yearly basis and, therefore, are familiar with these tasks. Instead of showing a trend for all of the children, the information showed strengths and weaknesses specific to each child.

Although it is not what was anticipated, the information provided by the TOSS-P still is very useful to classroom teachers. Seeing the results for each individual child gives information about each child's specific strengths and weaknesses in the area of semantic skills. This information would be useful in developing the course and goals of language therapy for each of these children.

It is recommended that schools for the deaf should consider using the TOSS-P as part of their annual testing. It provides much more information about a child's semantic skills than that obtained by simply administering the PPVT and EVT. The results of the TOSS-P, therefore, would provide one more piece of information to determine whether or not a child is ready to enter a mainstream classroom.

Implications

A child who scores poorly on the labeling tasks is lacking in his/her overall vocabulary. A teacher could take inventory of the child's tier one vocabulary and then move on to tier two.

Labeling is the most basic semantic skill; children have to be able to label the objects in their environment so that they can talk about them. Teachers must remember to constantly label things in the child's environment and in books. Once they have the "easy" label, the teacher should begin introducing a synonym. For example, if the child always says "rock," introduce "stone."

Children who struggle with categorization are experiencing difficulty with their ability to find similarities and differences in objects. It is common for teachers to teach the simpler categories such as numbers, animals, and food. It is not as common for them to teach higher level categories such as medicine and appliances. There are many commercial materials available that teachers can use to teach categories, as well as lists on the internet.

Children who struggle with identifying attributes need to understand that there are details and parts to a whole. Teachers can help children learn that there are different parts to objects by helping them learn and label their body parts, different parts of animals, cars, playgrounds, and fruit for example. Not only do we describe attributes by what we see but we can also describe them by how they smell, feel, taste and sound. Many of these could be addressed during snack, lunch, and recess.

Identifying and stating functions may be difficult for children who are deaf or hard of hearing because they tend to have fewer verbs in their vocabulary than they do nouns. Children need to be aware of what items do and how to use them. Teachers can give children these important words when they are playing in the sand box or at a sensory table, using silverware at lunch, or during art activities. Teachers should have toys in their rooms and the teachers should be giving the children the action words that go along with the play.

Although a child may be able to label vocabulary, he/she may not be able to define vocabulary. Children who have hearing loss should be given many opportunities to define words, during reading as well as language activities. Teachers should select words to define that are very relatable to children and of interest to the children. They should also give the children opportunities to listen to definitions and to try to guess the words being defined.

To help explain what a teacher could do to incorporate semantics into his/her everyday lessons, the following is an example of a week-long thematic unit on dogs. One activity could be to assemble parts of a dog: legs, body, head, and tail. The teacher could ask the child to identify each part, then ask the child to label each part (identifying and stating labels). To work on identifying and stating attributes, the children could then glue the parts together and talk about things related to a dog. (e.g. A dog has four legs and a tail. A dog barks. A dog has fur.) The children could also work on identifying and stating categories by sorting pictures of dogs by size, color, and breed. To help children identify and state functions and provide them with a larger vocabulary of verbs, they could study the different parts of the dog and discuss what they do (e.g. noses sniff, tongues lick, nails scratch, and tails wag.) Then the teacher could show the children some items that dog owners need for their dogs: a leash, a collar, bowls, a brush, and nail clippers. The teacher could show the children the objects and talk about the objects' functions. Lastly the children can work on their definition skills. At the end of the unit the teacher can have the children guess which item she is talking about after she gives a definition. She then can have each child take a turn defining words from the unit and having the other children guess. Together as a class they can make posters including all of the information they learned about dogs. Teachers could have an entire wall dedicated to posters about all of the things the children have learned about and explored in their classroom throughout the year.

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Table 1

	Identifying Labels	Identifying Categories	Identifying Attributes	Identifying Functions	Identifying Definitions	Stating Labels	Stating Categories	Stating Attributes	Stating Functions	Stating Definitions
Child 1	95	108	118	109	98	102	118	86	97	below
Child 2	82	90	106	72	90	92	107	84	100	91
Child 3	59	99	77	72	84	76	111	86	74	70
Child 4	107	97	89	98	122	127	117	106	107	123
Child 5	97	94	57	85	93	60	108	91	82	95
Child 6	96	84	76	110	83	89	96	91	87	90
Child 7	117	82	115	96	116	127	141	133	85	102
Child 8	107	97	98	90	88	99	96	98	100	72
Child 9	86	83	71	92	89	102	95	79	70	89
Child 10	106	74	76	91	72	96	115	83	102	98

Table 2

	Receptive Total	Expressive Total
Child 1	107	97
Child 2	87	94
Child 3	78	80
Child 4	104	122
Child 5	79	83
Child 6	85	87
Child 7	115	126
Child 8	94	94
Child 9	79	83
Child 10	87	101