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AUTHOR Camarata, Stephen M.; Leonard, Laurence B.
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ABSTRACT

In a study of very young children's pronunciation of nouns and verbs, ten children aged 20 to 25 months were exposed to experimental nouns and verbs, which had not yet been comprehended or produced by the children. Each of the objects and actions was given an experimental name based on phonemes in the children's speech. These objects and actions were named six times during each child's session. Three of the namings were paired directly with the object or action, and three were in comprehension and production probes. A production posttest was then given, in the same form as the production probe. Two types of response, spontaneous productions during the exposure sessions and responses during the posttest, were analyzed. Without exception, in both spontaneous response and posttest response, the children produced nouns more accurately than verbs, that is, with a higher percentage of correct consonants. This finding suggests an interaction between semantic and phonological domains. Further study of this and other possible language domain interactions is recommended. (MSE)

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YOUNG CHILDREN PRONOUNCE NOUNS MORE ACCURATELY THAN VERBS: EVIDENCE FOR A SEMANTIC-PHONOLOGICAL INTERACTION

Stephen M. Camarata & Laurence B. Leonard
Pennsylvania State University Purdue Univertsity

For some time, investigators have noted the important ways in which different components of language interact during the acquisition process (c.f., Aram & Kamhi, 1982). One dramatic example of this interaction among language components is seen in the child's second year, when significant changes are evident in the lexicon and in phonology. During this time, many new words are acquired. At the same time, the child's phonology becomes more systematic and less variable. Rather than representing independent events, these changes represent a coordinated occurrence. For example, Ingram (1976) has argued that the increase in the lexicon results in the child having to reorganize the phonological system. As the child advances in one domain, the system is simplified in another domain.

One interaction between phonology and the lexicon concerns production differences within nouns and verbs. For example, Coher (1978) reported that the percentage of correct /s/ production in nouns was higher than that seen in verbs for speech impaired and also in normal children. Camarata and Schwartz (in press) examined possible differences in noun and verb production in terms of an 'increasing complexity-decreasing phonetic accuracy' hypothesis. Within this view, verbs possess greater semantic complexity, and therefore place increased demands on the child's processing capacity. These increased demands have a price; newly emerging sounds within the child's phonological system may not b used in verbs, whereas such sounds are more likely to occur in the semantically less complex nouns.

The assumption of greater semantic complexity for verbs is based on the work of Gentner (1982). She noted that nouns are acquired earlier and in larger numbers than verbs (across languages), and argued than nouns have a 'more transparent semantic mapping.' Simply stated, Gentner noted that nouns refer to a set of relatively stable perceptual parameters, available t the child for ongoing analysis. Verbs, however, involve constant shifting of perceptual parameters and are therefore less accessible for analysis by the child. Additionally, Clark and Clark (1978) have argued that noun referents are inherently included in verbs because the verb forms involve an object undergoing movement. For example, the verb roll refers to some object (ball, dog, tire) undergoing a specific motion.

Camarata and Schwartz (in press) found preliminary support for this interaction between semantics and phonology. As one would predict, nouns were produced with greater phonetic accurac

are presented more frequently in mother's speech to children (Chapman, 1981). Nouns occur in the terminal portions of the adult utterances, as subjects and objects, whereas verbs occur in the central portion of the sentence (Chapman, 1981; Gentner, 1982). Nouns take fewer affixes, only plural and possessive, as compared to verbs. All of these factors may have contributed to the child's less accurate production of verbs, regardless of any influence from increased semantic complexity.

The purpose of the present study was to re-examine noun and verb production in young children with the addition of methodological controls which would minimize effects from the confounding variables mentioned previously. Specifically, experimental words were introduced into the vocabularies of young children under controlled conditions.

Method

Participants

Ten children between the ages of 1;8 and 2;1 participated as subjects. Five of the children were males, five were females. All of the children were within the normal range on the cognitive and language subtests of the Lexington Developmental Scale (Irwin, Ward, Greis, Deen, Cooley, & Auvenshire, 1974), and had achieved developmental milestones on schedule. Based on a sample of the children's spontaneous speech, the mean length of utterence ranged from 1.16 to 1.40 morphemes. This range was within normal limits according to Miller's (1981) normative data.

Speech Sample

A spontaneous speech sample of 200 utterances was obtained from each child within the home. These samples were gathered using a set of toys and picture books which were standard across children. A trained assistant interacted with the child while the investigator transcribed the child's utterances. Transcriptions were made using a broad level of the International Phonetic Alphabet, and verified using the audio taperecordings made of the sessions. The sampling session, and the subsequent experimental sessions were recorded, in stereo, using a Panasonic RQ J36 cassette recorder and two Sony ECM-150 microphones.

Experimental Words

Ten nouns and 10 verbs were selected for each subject. The referents for the nouns were small items which are not commonly presented to children (for example, a hydrometer). The verb referents were intransitive actions which children could demonstrate by manipulating a small doll (for example, rotating the doll at the waist). Based on parental report, none of these experimental nouns and verbs had been comprehended or produced by the child.

The experimenter then constructed experimental names to apply to these nouns and verbs. These experimental names were derived from the phonemes present within the individual child's spontaneous speech sample. Each child's syllable structure and consonant inventory, relative to the adult form of the word attempted, was noted. Consonants and consonant clusters which had been attempted by the child, but produced accurately in a maximum of 75% of occurrences, were included in the experimental words. These consonants appeared in the experimental words in only those word positions and syllable structures in which they had occurred in the spontaneous sessions.

The experimental noun and verb names were matched according to their consonant and syllable structure. That is, an object word was closely matched to an action word; the two forms differed only in terms of vowel content. For example, assume a child produced word initial /d/ and word final /k/ within the accuracy criteria mentioned earlier. Experimental words such as /dok/ and /dek/ would then be constructed and applied (randomly) to an action and an object. Please note that the vowel content was also matched; the consonants /d/ and /k/ must have appeared with both vowels within the spontaneous sample, or with neither of the vowels.

Procedure

Each word was pretested in order to ensure that none of the experimental words had been comprehended or produced by the child prior to the exposure sessions. All experimental objects were placed in front of the child, who was asked "What's this?" as the investigator held up each object. The investigator asked the child "What's the baby doing?" as he manipulated the doll through each experimental action. The item was replaced if the child produced the real name for a noun or a verb.

The 20 experimental words were presented to each of the 10 subjects during eight experimental sessions. The procedure was simply to name each of the objects and actions six times during each session. That is, three of the presentations were paired directly with the action or object referent for that word. For example, the investigator held up an object and said "Here's the /dok/" or performed an action with a doll and said "Watch baby /dek/." The remaining three presentations were production and comprehension probes, respectively. The investigator held up the object and said "What's this?" or manipulated the doll through an action and said "What's baby doing?" Regardless of the child's response, the experimenter then provided the experimental name for the object or action. The final two presentations were in the form of a comprehension probe. The child was asked to select the appropriate object or perform the appropriate action when probed with the question "Where's the _____" or "Make the baby ____." If the correct response was made, the experimenter said "yes, _____." If an incorrect response was made, the investigator said "Here's the ____" for objects and "Watch baby ____" for actions.

Production Posttest

Following the eight experimental sessions, a production posttest was given. The format was the same as for the production probe, the child was asked "What's this?" for objects and "What's baby doing?" for actions.

Production Scoring

Two types of responses were analyzed: (1) spontaneous productions during the exposure sessions, and (2) responses during the production posttest. Spontaneous, in this case, referred to experimental words which were produced in the presence of the experimental action or object, but not directly following the investigator's production of the word. Scoring was the same for both types of responses. The number of consonants produced correctly, relative to the target form of the experimental word, was divided by the total number of consonants present in the target word in order to derive the percentage of correct consonants. Note that only phonetic types, forms of the were which were different within the child's productions were included in the analysis. For example, let us return to the forms /dek/ and /dok/. Assume that the child produced the target /dek/ as [det] twice, as [gek] once, and as [dek] once. The accuracy for this word would have been 66.7 percent. There were six consonants present in three phonetic types, four of these consonants were correct. For the statistical procedures, these fractions were normalized using the arcsine transformation.

RESULTS

The results for each child are presented in tables 1 and 2. Every child, without exception, produced the nouns with a higher percentage of correct consonants within spontaneous utterances (Table 1) and within the production posttest (Table 2). These data were examined statistically using the single-factor analysis of variance for repeated measures, with the difference evident going beyond the .001 degree of probability.

Insert Tables 1 and 2 about here

DISCUSSION

The results indicate that nouns were produced more accurately than verbs within the experimental procedure. Quite clearly then, the children's phonological behavior varied according to word type. This finding suggests that a semantic-phonological interaction can be added to the list of reported interactions:

Table 1

Phonetic types, number of words attempted, and percentage accuracy for spontaneous productions.

	Object Words		Action Words	
Subjects	Percentage of Consonants Correct	Number of Phonetic Types (& Words Attempted)	Percentage of Consonants Correct	Number of Phonetic Types (& Words Attempted)
1	71.1	22 (9)	32.3	28 (9)
2	62.7	24 (10)	34.2	57 (10)
3	64.3	20 (9)	26.1	12 (7)
4	52.3	19 (9)	22.5	40 (10)
5	45.2	22 (10)	12.9	26 (10)
6	52.8	18 (10)	19.4	17 (9)
7	67.6	17 (8)	27.3	24 (9)
8	52.5	44 (10)	26.7	22 (9)
9	61.7	26 (10)	22.7	21 (7)
10	53.5	19 (8)	17.2	40 (9)

Table 2

Number of words attempted, and percentage accuracy for posttest responses.

	Object Words		Action Words	
Subjects	Percentage of Consonants Correct	Number of Words Attempted	Percentage of Consonants Correct	Number of Words Attempted
1	66.7	3	22.2	4
2	76.9	6	40.0	7
3	63.2	8	00.0	2
4	50.0	2	12.5	6
5	41.7	6	10.0	5
6	63.2	9	23.1	6
7	83.3	9	37.5	4
8	N/A	0	N/A	0
9	60.0	5	14.3	5
10	50.0	3	25.0	2

semantics and syntax, phonology and syntax, and phonology and pragmatics (Aram & Kamhi, 1982). This result is not surprising when we consider that children are using all aspects of language simultaneously when they attempt to communicate.

These results can be examined in light of Slobin's (1973) "new functions appear in old forms, new forms appear in old functions" hypothesis. He argued that the child uses increased processing capability to produce new forms or new functions. Such advances cannot co-occur because this would overextend the available processing capabilities of the child. Slobin (1973) noted that this phenomenon occurred within a variety of linguistic structures across many different languages. For example, Leonard (1976) noted that newly emerging grammatical morphemes would first appear in early, well established semantic relations, even if the child were capable of producing more advanced semantic relations. Similarly, deVilliers and deVilliers (1978) reported that children increased the use of phonological process, resulting in a decrease in production accuracy, when attempting two word utterances as compared to one word utterances.

A similar effect was observed here. The children were more likely to use the newly emerging phonemes accurately in the less complex nouns as compared to the more complex verbs. Recall that the consonants included in the experimental words had not been fully mastered by the children. Perhaps the semantic complexity of the word type, itself, served as a production constraint, similar to the effect observed in the acquistion of a new form or function. The increased semantic complexity of verbs results in a decrease in processing capacity available for phonological output. Moreover, Ingram (1976) also noted an apparent decrease in production accuracy when the child is faced with increased processing demands.

Perhaps the most important aspect of these results is that children apparently vary their phonetic accuracy according to word type. One wonders how much of the variability noted in children's phonologies can be attributed to such interactions among language domains. Additionally, we often base descriptions of phonology on speech samples gathered using common objects to elicit production. Such descriptions may provide an overestimate of the child's true capabilities.

This study is a preliminary attempt to understand the manner in which language domains interact. Future research could further specify such interactions. For example, only young children were included in the present study. To what age might this effect extend? Kempen and Huijbers (1983) reported that adults have different reaction times for identifying nouns and verbs. Is this effect also seen in other word types, such as modifiers? Because children face the complex task of language acquistion with cognitive and motor limitations, there are certainly many possible ways in which language domains could interact.

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