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ABSTRACT

A study was undertaken to determine whether children in early periods of language development use stress with any regular patterns, and if so, on what the patterns are based. The subjects were five children aged 21-29 months, MLU between 1.3 and 2.4. Tape recordings were made during play sessions with each child. Two-word utterances that could be clearly interpreted were extracted and grouped and their stress was determined. Analysis indicates that children have strong stress patterns and that semantic relations are more important to the child's stress than syntax. In use of locative phrases with verb-locative, the locative was stressed in every case. In modifier-noun use, the modifier was almost always stressed, in contrast to transformation generative theory. Other stress priorities are noted and arranged in a scale. It is proposed that children distinguish whether information in utterances is new or contrastive and apply stress accordingly, following a semantic hierarchy. The evidence showing that children early produce regular and significant patterns of stress is important for the syntax vs. semantics controversy in adult stress assignment. (CHK)

Stress Patterns of Early Child Language

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Stress Patterns in Early Child Language[1]

Linguists of the not so distant past spoke about linguistic stress being "phonemic", as evidenced by word pairs such as "pérmit" and "permít". More recently Chomsky and Halle (1968) reversed the earlier description and claimed that stress is predictable and can be assigned by syntactic rules. This syntactic approach to explaining stress was then attacked (notably by Bolinger, 1972, and Schmerling, 1971, 1974) on the premise that it did not give due consideration to semantics. The controversy continues in linguistic literature with good arguments being presented by both sides.

There is a gap, however, in the studies of linguistic stress assignment which coincides with a gap in studies of language acquisition: until the present study, little or no investigation had been made of the developmental aspects of stress. Psycholinguists and speech scientists have studied the perception and production of intonation patterns by infants (Lewis, 1936, Lenneberg, 1967, Menyuk and Bernholz, 1969, Kaplan, 1970, among many others). The role of stress in early telegraphic imitations has also been examined (Brown and Fraser, 1963, Blasedell and Jensen, 1970, Scholes, 1970, and Eilers, in press). But a child's first use of stress to distinguish meaning has largely gone unexplored. (Atkinson-King (1973) found that children as old as 13 years may not be able to operate entirely correctly with stress patterning.)

There has been some further evidence suggested in the literature that a child's sentence stress, the type of stress considered in this study, may reflect his syntax and/or semantics. Miller and Ervin-Tripp (1964) noted that their subject, Christy, said "Christy room" for the possessive meaning 'Christy's room', but said "Christy room" for the locative phrase 'Christy in the room'. Bowerman (1973) reports that Kendall 14 times out of 17 stressed the object more heavily than the subject in subject-object phrases and 10 times out of 12 stressed the "possessor" in possessive phrases. Anecdotal notes such as these provided the challenge for the present study. The work was aimed at a two-fold question: Do children in the early periods of language development use stress with any regular patterns, and, if they do, on what are the patterns based?

The subjects in this study were five children between the ages of twenty-one and twenty-nine months, MLU between 1.3 and 2.4. The data consisted of tape recordings made during play sessions with each child. The length of each session depended somewhat on the mood and verbosity of each child but was at least an hour for every subject. On-the-scene notes were made to facilitate later semantic interpretation and the tapes were transcribed by the investigator.

Table 1. Quantitative Description of the Language Samples

Child's Name	Total No. of Utterances	No. of Two-Word Utterances	MLU	Age When Taped - Months
David	162	59	2.30	25
Ken	332	79	1.52	24
Susan	181	68	1.75	23
Mark*	120	60	2.37	29
Seth	199	67	1.38	21

Two-word utterances for which clear semantic interpretations could be made were extracted from the total corpus, excluding phrases which were obviously imitations of immediately-preceding adult utterances. A two-word utterance is well-suited for basic stress studies because one need only determine which of two words is more highly stressed. The arguments about how many degrees of normal declarative stress exist and on which theoretical level did not concern us. We were interested only in the assignment of primary stress and did not make judgements at this time about the stress on the "other word."

Each utterance was judged for stress pattern by two or, in cases of disagreement, by three trained phonologists. Two of the three judges had no knowledge of the type of analysis which was to follow. The number of utterances on which the first two judges disagreed was small, never more than five times (or 7.5 percent) on any one child's corpus.

*I wish to thank Rebecca Eilers for the use of her tape of the play session with Mark.

The entire corpus of each child's utterances was analyzed and context free phrase structure rules and lexicon feature rules were written for each child. The two-word utterances were grouped by type of structure (see sample corpus, Table 2) and the pre-judged stress patterns were compared both within and between groupings. The results of this analysis indicate that children do have very strong patterns of stress in their speech. Furthermore, it appears that the semantic relations being expressed by the child are more important to his assignment of stress than are syntactic category labels such as adjective, noun phrase, noun or verb.

Table 3 gives a summary of the seven most common phrase types in the data for the five children in this study. The numbers indicate the number of times the particular type of phrase was said with stress in the given position. For instance, Ken produced 8 verb + object utterances and each time stressed the object, therefore under V + Object Ken's square reads 0.8. Mark produced seven verb + object phrases and 6 times he stressed the object and one time he stressed the verb, 1,6. A dash (--) in a box indicates that the sample for a child did not include any examples of the type of utterance heading the column.

One of the most clear-cut examples of the priority of semantic relations is in the children's use of locative phrases, especially when in construction with verbs. There were 23 examples of verb - locative in the data; in every case the locative element was stressed.

Table 2. Sample Corpus, David MLU 2.30

Modifier - Noun (8, 3)[a]	Subject - Verb (0, 12)
my boots	rabbit jump
Mommy boots	cowboy rides
rabbit house	engine pull
jetplane wings	people buy
people house	kitten stop
wings plane	rabbit go
picture plane	robot walking
busy farmer	train go
one wings	elevator come
toy soldier	people live
	airplane comedown
Verb - Locative (0, 3)	mouse comedown
play museum	
put in that	Noun - Locative (1, 8)
sitdown bicycle	people library
	here arch
Verb - Object (1, 7)	kids schoolbus
cooking eggs	penny inside
brush teeth	rabbits in room
want plane	firetruck street
talk telephone	rabbit down
see train	mouse on top
put coffee	mouse library
hit me	
like cowboy	

a. The numbers indicate the times each element was stressed

Table 3. Data* Tabulation

Child & MLU	Type of Construct					
	V + Object	V+it	Agent+V	Object+Loc	V+Loc	Poss+Ob
David 2.30	1, 7	--	0,12	1, 8	0, 3	8, 0
Ken 1.52	0, 8	13, 0	0, 2	9, 3	0, 10	5, 1
Susan 1.75	0, 3	--	0, 5	4, 3	0, 2	7, 0
Mark 2.37	1, 6	6, 0	0, 1	0, 3	0, 8	1, 0
Seth 1.38	0, 2	--	0, 1	--	--	6, 0
No. Utterances	28	19	21	31	23	28
Most Common Pattern	V + Ó	V + it	A + V́	O + Ĺ	V + Ĺ	POSS +
No. of Deviations	2	0	0	14	0	1

*Does not include phrases judged as contrastive or emphatic.

Table 3. Data* Tabulation

	Type of Construct					
Object	V+it	Agent+V	Object+Loc	V+Loc	Poss+Object	Att+Object
7	--	0, 12	1, 8	0, 3	8, 0	0, 3
8	13, 0	0, 2	9, 3	0, 10	5, 1	0, 7
3	--	0, 5	4, 3	0, 2	7, 0	1, 20
6	6, 0	0, 1	0, 3	0, 8	1, 0	6, 3
2	--	0, 1	--	--	6, 0	8, 32
8	19	21	31	23	28	80
+ Ó	V + it	A + V́	O + Ĺ	V + Ĺ	POSS + O	ATT + Ó
2	0	0	14	0	1	15

*Phrases judged as contrastive or emphatic.

This was true whether the locative was expressed as a noun ("play muséum"), a pro l ocative ("goes hére"), or a preposition ("coming úp"). It should be added here that the stress assignment was more consistent for the children than was word order: for instance, one child said "rúg jumped" as he jumped from a box to the rug-covered floor; similarly, the locative was stressed in the utterance "hére goes", which meant 'here is where it goes', just as it was in "goes hére", meaning 'it goes here'.

Another type of construction which showed significant patterning was modifier-noun phrases. There were a total of 108 phrases of this type and at first glance there seemed to be no regularity in the stress assignment. However, when the utterances were divided into two groups, possessive and attributive, a striking pattern appeared. Of the 28 possessive phrases, 27 had primary stress on the possessive element. See Table 3. Examples included "mý boot, rábbit house, élephant's foot". The attributive phrases showed a pattern only slightly less stable: 65 out of 80 utterances had stress on the head noun. (The data for just two of the children, however, account for 14 of the "exceptions" and some of these examples can be explained in terms of a more general notion--old versus new information--which will be discussed shortly.)

This patterning of modifier-noun phrases is especially noteworthy when related to theories of syntax. In adult grammars modifier-noun phrases are typically transformationally derived

from underlying sentences. That is, "little fish" is said to come from $_{NP}$ [fish $_{S}$ [fish BE little] $_{S}$] $_{NP}$ and "John's book" from underlying $_{NP}$ [book $_{S}$ [John has a book]$_{S}$]$_{NP}$. In child grammars, however, modifier-noun phrases have usually been generated directly as expansions of NP because there is almost no evidence for embedding in low MLU language samples. The stress evidence presented here, though, shows that possessive and attributive phrases are treated differently by the child and should therefore be analyzed separately. Case grammars (Fillmore, 1968) may be a way out of the dilemma. In case grammars, the child's possessive phrases would be analyzed as Verb plus Dative case noun and the attributive phrases would be Verb plus Objective case noun. The phrase types are nicely distinguished, no embedding is required, and attributive plus noun stress patterning is already accounted for in the stressing of other Verb plus Objective phrases, where the objective case noun is stressed.

Other construction types were also found to display distinct patterns; see Table 3. In verb + object utterances, as mentioned above, the object was stressed 26 out of 27 times. In agent + verb constructions, the verb was stressed each of 21 times (i.e., an agent was never stressed by any of the children in a non-contrastive, non-emphatic utterance).

One can construct, by overlapping like members of the different types of two-word utterances, a hierarchy of stress assignment which

seems to be operating for each child. Highest in priority, that is, most likely to be stressed, are locative and possessive elements.[2] Then, in order, are objective, attributive, verbal elements. Last on the scale is agent. This ordering of semantic relations is very close to the inverse of Fillmore's (1971) ordering of noun arguments for subjectivization. It is also nearly identical to Chafe's (1970) hierarchy for the position of "new" information in a sentence.

In fact, when one looks closely at the data in the present study, especially at what superficially appear as exceptions to the patterns, the distinction between new and old information seems applicable to child stress patterns. In the sample from David, two out of ten noun + locative phrases had stress on the noun instead of the locative. In both cases, David was answering a question about "what" was in a given position. The object noun was the new material and was stressed accordingly.

Mother:	What is on the side of the milktruck? (pointing to a letter A on the side of a truck in a book)	David:	Milktruck B́ (emphatic stress)
Mother:	What's in the street?	David:	Fírétruck street

These were the only times when a locative went unstressed and the only answers to questions about what happened in a given place.

The normal pattern of stress on the object instead of the verb was broken only once. Mark said "More marble. Marble down. One marble missing. Sée marble." When Mark said "Sée marble," he was

exclaiming at having found the marble he had lost and been looking for. His grammar arranged the words in the usual order--verb before object--but the words were marked in a different way for the semantic feature "new." In the last phrase, "marble" is old information and "seeing it" is new. The stress pattern was changed from the usual pattern of stress on the object to correspond to the context of the utterance.

The data for the youngest subject, Seth, also showed interesting use of the concept "new." There were 20 adjective (not including recurrence forms such as "more")[3] + noun phrases, and 16 times the noun was stressed, as with the other children's patterns. All four of the examples where the stress fell on the adjectives instead of the nouns were in sequence where the noun was mentioned first, then the adjective added as new information:

Seth:	Man.	and Ball.	and No sock.
	(pause)	(pause)	(pause)
	Blue man.	Nice ball.	Blue sock.
		Orange ball.	

Seth would introduce a topic and then add some new information about it, giving stress to the new material. In examples where the adjective appeared with the noun when it was first mentioned, the noun was stressed--for example, "dirty hand."

I would propose, therefore, that, like adults (Chafe, 1970), children operate with an appreciation for what is new in their utterances and apply stress accordingly. Furthermore, I would suggest that within the new information being presented there

operates a hierarchy of semantic relations which determines stress assignment more specifically.

The importance of distinguishing new from old information is also demonstrated in the use of the pronoun "it." The children recognize the difference between pronouns and nouns, even if they have the same referents. Pronouns imply an antecedent and are not therefore "new" material and do not normally receive heavy stress. Ken's verb + object constructions were the best example of this knowledge: of 21 verb-object phrases, 13 had "it" as object and those same 13 had stress on the verb. The eight remaining phrases had stress on the noun objects. Mark also exhibited the same behavior; in fact, there are no examples in the data where a child stressed "it."

In the data of this study, there were 25 clear examples of contrastive stress. In each case, the stress was heavier than usual for the child and the utterance was in a context of "listed phrases" where part of the utterance was a repetition of an adult utterance or the previous utterance of the child. For instance, David's mother said "First the train can go," then David continued "Fíretruck go," "Cár go." Similarly, after the investigator said "Whose shoes are these?", Susan answered "Mómmy shoes. Mommy sóck. Mommy éar. Mommy bóok."

Consider the possibility that above locative on the stress hierarchy is the entry "contrast." The items listed in the

hierarchy are all semantic notions that are somehow basic to the human mentality. The grammatical categories which are used to express these relations can vary both within and between languages. Likewise, it appears inconsequential to stress assignment in child language whether, for instance, locative is expressed by means of a noun, a preposition or a prolocative. Perhaps it is also of no consequence what type of element fills the contrastive slot; it could be a preposition--"shoes on, shoes off"--an object noun--"Mommy coat, Mommy shoe"--or a possessive--"Mommy boots, my boots." The semantic relation of contrast seems to operate in stress assignment as an "override" on the "new" hierarchy.

To phrase this somewhat differently, the initial decision is whether the utterance is "contrastive" or whether the new hierarchy is to be followed. If the "contrastive" is chosen, then the particular items being contrasted are stressed. If the other alternative is chosen, the new information is stressed following the hierarchy in the "unmarked" cases. Answers to questions can sidestep the semantic relation hierarchy, sticking more strictly to the simpler notion of "stress the new information." There are, undoubtedly, many other contexts in which the semantic relation hierarchy is rescinded in favor of a "more marked" placement of new information.

It is possible, too, that contrastive sentences require a special context. In all of the examples found in this study, contrastive sentences appeared in "listing" contexts. The require-

ment of a special context may be what makes some sentences "more marked" than others and allows the hierarchy of stress assignment to be altered.

Whatever may become of contrastive stress analysis, there is strong evidence, I feel, that children can, at the time they are first combining words, produce regular and significant patterns of stress. I feel this data from early child language, showing the priority of semantic factors, should not be ignored in the syntax vs. semantics controversy in adult stress assignment.

Footnotes:

1. This paper is a shortened version of a Ph.D. dissertation presented to the Department of Linguistics, University of Washington, in November 1974. The research was supported by National Institutes of Health contract (NIH-NICHD NO1-HD-3-2793).

2. Some relation pairs, for instance possessive + locative, did not occur in the data and cannot, therefore, be ordered with respect to each other.

3. Seth produced 20 utterances with "more"--including six different nouns. Fourteen times the noun was stressed and four times "more" was stressed. There was no obvious reason for this pattern variation; no semantic differences were detected. All of the judges found, however, that these four phrases were very hard to judge and in a few cases both words in an utterance seemed to have equal stress.

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