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Grammatical Morpheme Development in Three Language Disordered Children

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The order and rate of acquisition of Brown's (1973) 14 grammatical morphemes were investigated in three children with language disorders. Periodic spontaneous language samples were analyzed for correct and incorrect use of the morphemes in obligatory contexts. Results indicated that the groups' order of acquisition was similar to that reported by Brown (1973) and deVilliers and deVilliers (1973) for normal children, but that there were individual variations in the children's acquisition orders. Also, the language disordered children demonstrated a much slower rate of acquisition than that reported for normally developing children.

INTRODUCTION

One important aspect of language development is acquisition of the grammatical morphemes. These morphemes are necessary for noun and verb phrase expansions and for formation of adult-like negatives and questions. Brown (1973) described the order of acquisition of 14 grammatical morphemes in the language of three normal children. This sequence was "approximately invariant" for these three children for mean length of utterance (MLU) stages II through V. DeVilliers and deVilliers (1973) reported a similar sequence of acquisition in a cross-sectional study of 21 children. Both Brown and deVilliers and deVilliers reported that the development of particular grammatical morphemes occurred within particular MLU stages. Johnston and Schery (1976) looked at these same 14 grammatical morphemes in a cross-sectional study of 287 language disordered children between the ages of 3;0 and 16;2 years. They found that the language disordered children acquired the 14 grammatical morphemes in much the same order as Brown described. However, they did report some differences between the normal and the language disordered children's acquisition. The major difference was that the children with language

disorders reached 90% acquisition criterion one or two MLU stages later than normal children, "despite the fact that they first used many morphemes at the earliest levels" (Johnston & Schery, 1976, p. 253).

Although the results of Johnston and Schery's cross-sectional investigation indicated that language disordered children acquire the grammatical morphemes in a normal sequence, no longitudinal study has confirmed this sequence for language disordered children. The present longitudinal study was designed to investigate the development of grammatical morphemes in three language-impaired children and to compare their development with the available data on normal children. Specifically, this study attempted to determine if the order of acquisition of the 14 grammatical morphemes for these three language disordered children was similar to the normal sequence reported by Brown (1973) and deVilliers and deVilliers (1973). The study also was designed to determine if the rate of acquisition was similar to that of normal children.

METHOD

Subjects

Three public school children who were initially diagnosed as having delayed expressive language and unintelligible speech served as subjects in this study. All three children were seen daily for speech therapy from September 1976 through June 1980. A series of diagnostic tests was administered in September 1976. The results of these diagnostic tests indicated that the children's overall language performance was approximately two years below the expected level for their chronological ages, which ranged from 6;7 to 7;1 years. Individually tested IQ's were within the normal range for all three subjects. Test results are presented in Table 1.

Therapy conducted between September 1976 and December 1979 included articulation drills, spatial relationships, sorting of objects into classes, cognitive language development, auditory and visual sequential memory, comprehension and recall of orally presented stories, and sequencing of events. Although working on spatial relationships could have influenced development of *in* and *on*, two subjects were using these at criterion by September 1976, and the third (TK) used *in* at criterion and *on* 2/2 times in September 1976.

Language Samples

Ten or eleven spontaneous language samples were obtained from each child during a fifteen month period (9/78 to 12/79). In addition, three language samples obtained during the preceding two years (1976

Table 1. Pre-test data on the three subjects (9/76).

	AH	TK	CP
Chronological age	7;1	6;7	6;8
[1]Test for Auditory Comprehension of Language	5-0	4-9	4-9
[2]Peabody Picture Vocabulary Test (Forms A, B)	4-10	6-6	4-11
[3]Elicited Language Inventory	<3-0	<3-0	<3-0
[4]Grammatic Closure	4-6	5-2	3-3
Goldman-Fristoe Test of Articulation	18 errors	26 errors	23 errors
MLU	4.0	3.25	3.3
Stanford Binet IQ	110	107	100
Hearing	wnl	wnl	wnl

[1] Carrow (1973)

[2] Dunn (1965)

[3] Carrow (1974)

[4] Subject of the *Illinois Test of Psycholinguistic Abilities* (Kirk, McCarthy, and Kirk, 1968)

and 1977) were included in order to observe development of the 14 grammatical morphemes over a longer period of time. All language samples were taken during 30 minute periods of natural conversational interaction between each child and the first author (who also was the children's speech-language pathologist). No external stimulus material, such as pictures or objects, were involved and the children were encouraged to talk about whatever they wished to. Usually, the children talked about events that occurred at home or in school. The first author acted as an interested listener who made relevant comments or asked an occasional question to keep conversation going. All samples were tape recorded and transcribed by the first author. A mean length of utterance in morphemes (MLU) was computed for each of the transcribed samples. Each sample was analyzed to determine

the percent correct use of each of the grammatical morphemes in obligatory contexts. To reduce variability, percent correct use was analyzed only when there were at least three obligatory contexts for a morpheme present in the sample. Criterion for acquisition of a morpheme was 90 percent correct use in obligatory contexts in three successive language samples having the required three obligatory contexts for the morpheme. The actual point of acquisition of the morpheme was defined as the first speech sample of the three (Cazden, 1968; Brown, 1973).

Obligatory contexts were defined as those contexts in which a particular morpheme is required to appear according to the rules of Standard American English. Brown's (1973) guidelines were followed in determining obligatory contexts. In an attempt to improve the accuracy and precision of scoring, only those utterances for which there were unambiguous contexts were analyzed. Contexts were excluded when it was not clear which morpheme should have been used or when there was not a clear requirement for a morpheme. An example of an utterance in which it was not clear which morpheme should have been used was "My daddy go to grandma's." It was not clear whether the child should have used the regular third person singular (i.e., "goes"), the auxiliary plus the progressive (i.e., "is going"), or the irregular past (i.e., "went"), because the context was ambiguous. An example of an utterance in which there was not a clear requirement for a morpheme was the response "me" to the question "Who is the oldest?" We could have treated this as an obligatory context for the copula (i.e., "I *am*"); however, the child's response did not establish an unambiguous context for the copula. The issue of contractibility and uncontractibility of copula and auxiliary verbs has been discussed by Brown (1973) and Kuczaj (1979). We considered a form contractible or uncontractible on the basis of sentential position, phonological constraints, and the uncontractibility of the form itself. For example, the copula or auxiliary are uncontractible in yes/no questions (e.g., "Is he crying?") on the basis of sentential position. Copula and auxiliary verbs also may be uncontractible when they follow words ending with certain consonants (e.g., "This *is* mine.") The copula is contractible due to a phonological constraint in this case. Finally, the forms *was* and *were* are always uncontractible.

The first author retranscribed and rescored three randomly chosen samples for each of the three subjects to determine intrajudge reliability. Agreement between the first and second transcriptions of these samples was 97%; the agreement between the first and second scoring of the samples was 98%. Interjudge reliability for transcription was established by having a trained speech-language pathologist, who was

not involved in the study, transcribe 25 of the children's utterances from three randomly selected samples for each of the three subjects. The agreement between the independent judge's and the first author's transcriptions of the 75 utterances was +.91 for AH, +.92 for TK, and +.91 for CP. Reliability of scoring the correct use of the grammatical morphemes in obligatory contexts was determined by having the second author independently score the first, the fifth, and the last language sample for each of the subjects, making a total of nine samples scored by both experimenters. Agreement between the first and second authors' scoring ranged from 90 to 100% for these nine samples.

RESULTS

The MLU's for each language sample for each subject are presented in Table 2. The language samples, which were obtained in 30 minute periods, ranged from 93 to 141 utterances, with an average of 117 utterances per sample.

Table 2. Pre-test data on the three subjects (9/76).

	AH	TK	CP
September 1976	4.00	3.25	3.17
June 1977	4.90	3.17	4.40
September 1977	5.70	4.60	4.60
September 1978	5.60	4.56	4.58
November 1978	6.13	4.66	4.74
December 1978	5.47	—	4.12
January 1979	5.75	4.34	4.93
February 1979	6.59	5.26	4.58
March 1979	7.18	5.43	4.68
April 1979	5.37	3.60	3.72
May 1979	5.68	4.19	4.00
June 1979	5.26	5.82	3.96
September 1979	5.80	4.70	4.42
December 1979	5.11	5.22	4.30

At the first data collection period in 1976, one subject (AH) was already in Brown's stage V with an MLU of 4.0 morphemes. The other two subjects (TK and CP) were in stage III, with MLU's of 3.25 and 3.17 morphemes, respectively. By the following September (9/77), all three subjects had MLU's above 4.0 morphemes, placing them in stage V. They were considered to be at or beyond stage V for the rest of the data collection period, even though there were three samples in which the MLU value dropped below 4.0 morphemes. The decision to view the children's stage level as at least V is based on Brown's (1973) statement that "Stage I, for instance, begins as soon as the MLU rises above 1.0..." (p. 58). We assumed therefore, that stage V began as soon as each child's MLU rose above 4.0 morphemes, regardless of minor fluctuations in MLU at different sampling points.

Tables 3, 4, and 5 present the percent correct use of the 14 morphemes in each sampling session for the individual subjects. The data for AH is given in Table 3, for TK in Table 4, and for CP in Table 5. Blanks indicate that there were fewer than three obligatory contexts present for the morpheme in that sample. The point of acquisition for those morphemes which reached criterion is indicated by an asterisk next to the percent correct. The first left-hand column shows the MLU stages in which Brown (1973) reported that his three normal subjects reached criterion for the morphemes.

A comparison of the children's MLU stages (Table 2) with the grammatical morphemes which reached criterion reveals a significant delay in acquisition of the morphemes. By September, 1977, all three children were in Stage V (MLU's of 4.0+ morphemes); however, none of them had reached criterion and only AH was approaching criterion for any stage V morphemes. As of September, 1977, AH had acquired three of the four stage II morphemes (*in*, *on* and plurals), one stage III morpheme (uncontractible copula), and one stage IV morpheme (articles); and CP had acquired three stage II morphemes (progressive, *in* and *on*) and the stage IV articles. By the end of data collection in December, 1979, AH's MLU was greater than 5.0 morphemes, but he had reached criterion for only two of the later developing morphemes (contractible copula and contractible auxiliary). He also was approaching criterion for two other stage IV morphemes (past regular, and third person singular regular) and one other stage V morpheme (uncontractible auxiliary). At the end of data collection, CP's MLU placed him within stage V; however, he had reached criterion for only one of the stage III (irregular past), one stage IV (articles) and one of the stage V (contractible copula) morphemes. He was approaching, but had not reached, criterion for two other stage III morphemes (possessive and uncontractible copula). By December, 1979, TK, whose

Table 3. Percent correct production of the 14 morphemes for AH for each session from 9/76 through 12/79.

Acquisition Stage (Brown, 1973)	Morphemes	9/76	6/77	9/77	9/78	11/78	12/78	1/79	2/79	3/79	4/79	5/79	6/79	9/79	12/79
II	progressive	100	100	75		100*	100		100		100	100	100	100	100
	in	100*	100	100	100	100	100			100	100	100	100	100	100
	on	100*		100	100	100	100			100		100		100	100
	plurals	100*	92	100	100	100	100			100	88	100	100	100	100
III	irregular past		88	79	97	100	75	100	100	86	100*	100	100	88	60
	possessive			0		50		0							
	uncontractible copula	69		91*	92	93	100		100	100	100	100	88	75	100
IV	articles	88	100*	100	100	100	100	100		95	100	97	100	96	100
	past regular		63	57		67			100	67	100	71	100	100	
	third person sing. regular		75										100		100
V	third person sing. irregular	0	17												
	uncontractible auxiliary					100					100				
	contractible copula	100	80	100	80	100		100		75	67	100*	100	100	83
	contractible auxiliary		50				100*		100		100	100		100	

* Point of acquisition = first sample of three with at least 90 percent correct use.

Table 4. Percent correct production of the 14 morphemes for TK for each session from 9/76 through 12/79.

Acquisition Stage (Brown, 1973)	Morphemes	9/76	6/77	9/77	9/78	11/78	1/79	2/79	3/79	4/79	5/79	6/79	9/79	12/79
II	progressive	100*	100		100	100			100	100	100	100	100	100
	in	100*	100	100	71	100	100	100	100		100	100	100	100
	on		100*	100		100	100	100	100			100	100	100
	plurals	50	100*	100	100	100	100	100	100	100	100	100	100	100
III	irregular past		29	18	7	86	80	25	61	45	69	86	80	90
	possessive										75			0
	uncontractible copula		0	0		78			100	57	91	89	91	100
IV	articles	31	50	79	100*	95	96	91	97	80	89	91	90	96
	past regular	0	13	20					33		9	37	56	79
	third person sing. regular	0	0	0	0			0						20
V	third person sing. irregular	0					0		33					
	uncontractible auxiliary		0						100			69	100	25
	contractible copula	29	0	0	67	33	0	33	100		43			33
	contractible auxiliary	17	0				20		0				0	

* Point of acquisition = first sample of three with at least 90 percent correct use.

Table 5. Percent correct production of the 14 morphemes for CP for each session from 9/76 through 12/79.

Acquisition Stage (Brown, 1973)	Morphemes	9/76	6/77	9/77	9/78	11/78	12/78	1/79	2/79	3/79	4/79	5/79	6/79	9/79	12/79
II	progressive	100*		100	100	100	100		100		100			100	
	in	100*	100	100	100		100	100	100				100	100	
	on	100*	100		100			100	100				100	100	
	plurals	79	100	73	100*	100	100	100	100	90	100	100	100	100	92
III	irregular past	67	65	79	88	100*	100	96	83	94	78*	92	100	84	83
	possessive		40	100				0	83	100		100			
	uncontractible copula	0	67			100		67	100					80	
IV	articles	81	100*	94	94	100	92	87	100	100	100	100	100	92	86
	past regular		18	44	67	33	67	33		100	50		75	0	
	third person sing. regular	23		0			15				0			33	40
V	third person sing. irregular	0	0	25								33		50	
	uncontractible auxiliary					83			100		33				
	contractible copula	7	0	33	100*	100						100		100	
	contractible auxiliary	40		44					33		33			20	

* Point of acquisition + first sample of three with at least 90 percent correct use.

MLU of over 5.0 morphemes placed him beyond stage V (Miller, 1981), had reached criterion for none of the stage III morphemes, only one stage IV morpheme (articles), and none of the stage V morphemes. Although he was close to criterion for at least two stage III morphemes (irregular past and uncontractible copula), he did not obtain criterion before the end of data collection.

A rank order of acquisition for all 14 morphemes was obtained for each subject using the method described by Brown (1973). First, the morphemes which reached criterion (90 percent correct use in three successive samples) were ranked according to the first of the three samples in which they reached criterion. Then the remaining morphemes (those that did not reach criterion) were ranked according to the mean percentage of correct use in the last three samples in which there were at least three obligatory contexts present. If there were not three samples containing the required three obligatory contexts for analysis, then the ranking was based on the number of samples which did contain three obligatory contexts. Thus, the rankings of two morphemes for AH and one morpheme for TK were based on only two, rather than three, samples. In order to obtain a single rank order for the 14 morphemes, we followed Brown's (1973) procedure of averaging the rank orders across the three subjects. Table 6 presents the rank orders for each subject and the mean rank of each of the 14 morphemes. In order to determine the degree of relationship among the children's orders of acquisition, Spearman rank order correlations were performed. The correlations, which were significant, ($p < .005$) were as follows: AH with TK, +0.80, AH with CP, +0.71, and TK with CP, +0.90. These correlations indicate that the three subjects' orders of morpheme acquisition were very similar. They are comparable to Brown's (1973) correlations of +0.88, +0.86, and +0.87 for his three normal subjects' acquisition orders.

Table 7 shows the rank order for the 14 morphemes from the children in the present study, from Brown's three subjects, and from deVilliers and deVilliers' (1973) cross-sectional data for 21 subjects. Johnston and Schery's (1976) rank order for acquisition for their language disordered subjects was not compared with ours because of methodological differences in the way the rank orders were obtained. They based their acquisition order on the language level at which each morpheme was used correctly in 90 percent of the obligatory contexts by 50 percent of the subjects at that level, while we rank ordered on the basis of the time of the sample in which a morpheme was acquired.

Spearman rank-order correlations among the acquisition orders from Brown's, deVilliers and deVilliers', and our study were all significant ($p < .005$). The correlations were as follows: our order and Brown's

Table 6. Order of acquisition of the 14 grammatical morphemes for each subject and the average rank for each morpheme (across the three subjects).

Morphemes	AH	TK	CP	Average Rank
progressive	6	1.5	2	3
in	2	1.5	2	1
on	2	3.5	2	2
plurals	2	3.5	5.5	4
irregular past	8	7	7	7
possessive	13	11	8	10
uncontractible copula	5	6	9	6
articles	4	5	4	5
past regular	12	10	11	11
third person singular regular	11	13.5	14	14
third person singular irregular	14	12	12	13
uncontractible auxiliary	10	8	10	9
uncontractible copula	9	9	5.5	8
contractible auxiliary	7	13.5	13	12

Correlations: AH with TK $r = .80$, $p < .001$
AH with CP $r = .71$, $p < .003$
TK with CP $r = .90$, $p < .001$

order, +0.78, our order and deVilliers' order, +0.73, Brown's order and deVilliers' order, +0.84.

DISCUSSION

The first question of interest in this study was whether language disordered children, studied longitudinally, acquire the 14 grammatical morphemes in the same order as normally developing children.

Table 7. Comparison of the order of acquisition from the current study with order of acquisition from previous studies of normal children (Brown, 1973; deVilliers and deVilliers, 1973).

Morphemes	Current Study	Brown	deVilliers & deVilliers*
progressive	3	1	2
in	1	2.5	4
on	2	2.5	2
plurals	4	4	2
irregular past	7	5	5
possessive	10	6	7
uncontractible copula	6	7	12
articles	5	8	6
past regular	11	9	10.5
third person singular regular	14	10	10.5
third person singular irregular	13	11	8.5
uncontractible auxiliary	9	12	14
contractible copula	8	13	8.5
contractible auxiliary	12	14	13

Correlations:	Current study with Brown	$r = .78, p < .001$
	Current study with deVilliers & deVilliers	$r = .73, p < .002$

The correlations between the acquisition orders for the language disordered children and for Brown's (1973) and deVilliers and deVilliers' (1973) normal subjects indicate that the order of acquisition is very similar for language disordered and normal children. These results support the cross sectional data from Johnston and Schery's (1976) study of language disordered children's use of grammatical morphemes. They reported that their language disordered children ac-

quired the 14 grammatical morphemes "in much the same order as normal children" (p. 250).

The second question of interest was whether the rate of acquisition was similar to that reported for normal children. At the point in time that all three language disordered subjects had MLU's placing them in stage V or above, none of them had reached acquisition criterion for any stage V morphemes. By the end of the study, the child with the highest MLU values throughout the study (AH) had reached criterion for only one stage IV and two stage V morphemes. The other two subjects demonstrated similar significant delays in their acquisition of the morphemes. TK, whose MLU placed him in stage V by September, 1977, had acquired no stage V morphemes and only one stage IV morpheme by the end of data collection two years later. CP had an MLU of 4.0+ morphemes in June, 1977; however, he had reached criterion for only one stage IV and one stage V morpheme by the end of data collection in December, 1979. Thus, it is evident that compared to normal children, all three of the language disordered subjects were significantly delayed in morpheme acquisition. Johnston and Schery (1976) also found that their language disordered subjects acquired grammatical morphemes at later language levels than did Brown's (1973) and deVilliers' (1973) normally developing subjects.

The results of this study have some important implications for language remediation. First of all, language disordered children in a particular MLU stage should not be expected to have acquired the grammatical morphemes normally associated with that MLU stage. Although language disordered children's order of morpheme acquisition is similar to normal children's, their rate of morpheme acquisition is not commensurate with their MLU. Therefore, in planning a remediation program which includes grammatical morpheme development, the important factor is the general order of acquisition for the 14 morphemes rather than the acquisition by MLU stage.

Based on the results from this study and from Johnston and Schery's study, it is tempting to assume that Brown's (1973) order of acquisition can and should be used to determine the order for training grammatical morphemes. However, we would like to insert a note of caution about this assumption. Although language disordered children *as a group* follow an acquisition order similar to that reported for normal children, an individual child may not follow that order very closely. Let's examine the order of acquisition for one subject, AH, for evidence of clinically relevant individual variation. The earliest morphemes acquired by AH were the prepositions *in* and *on* and noun *plurals*. If our task were to decide which morphemes we should work on developing next, we could rely on Brown's order of acquisition and

choose the *progressive* as the first target morpheme, followed by the *irregular past,* the *possessive,* and the *uncontractible copula.* AH, however, acquired the *articles* before any of the morphemes we chose using Brown's acquisition order. Our choice of the *progressive,* which was close to criterion, and the *uncontractible copula,* which AH acquired immediately after the *articles,* would have been satisfactory. The *irregular past,* although not used at criterion level until long after the *articles* and the *uncontractible copula,* also would have been an acceptable choice because AH was in the process of acquiring it (about 80% correct production). However, trying to train correct use of the *possessive* could have been very frustrating because AH used it so infrequently and had not reached criterion on it at the end of data collection. Relying solely on Brown's order of acquisition to determine the order for remediation could result in working on a morpheme long before a child is ready to acquire it, while postponing training of "later developing" morphemes that the child may be ready to acquire.

In cautioning against complete reliance on the normal developmental sequence, we do not mean to suggest that the speech-language pathologist should ignore normal developmental information in setting remediation goals. On the contrary, we believe that normal development should be a basic and integral part of all language remediation approaches. However, normal developmental data should be combined with information about each child's unique sequence of development in setting goals for therapy. Khan and James (1980) have described such a procedure in some detail. If we again consider the data from AH, we can see how the child's individual pattern of development can be combined with the order of acquisition described by Brown to establish an appropriate remediation sequence. At the point in time that AH had reached criterion for *in, on* and *noun plurals,* the other morphemes that he frequently used correctly included the *progressive, articles,* the *uncontractible copula* and the *contractible copula.* Of these four morphemes, the *progressive* is the earliest developing morpheme according to Brown's (1973) and the deVilliers' (1973) data from normal children. Therefore, that would be the most logical morpheme to train first. Next, we might choose the *uncontractible copula* because it develops in an earlier stage (III) than either *articles* (IV) or the *contractible copula* (V), or we might choose *articles* over the *uncontractible copula* because the percent correct use was slightly higher for articles (88% vs. 69%). Thus, based on a combination of the normal developmental data and AH's own pattern of morpheme use, we would choose to work on the *progressive* first, followed by either the *uncontractible copula* or *articles,* and then the *contractible copula.* This sequence closely parallels the actual pattern of ac-

quisition demonstrated by AH. By using both Brown's order of acquisition for the morphemes and the child's own individual acquisition patterns, the speech-language pathologist can determine the most appropriate sequence for remediation for each individual child.

SUMMARY

The results from this longitudinal study of three language disordered children indicate that language disordered children acquire grammatical morphemes in the same general sequence as do normal children, but at a significantly slower rate. These findings agree with those of Johnston and Schery (1976). Although language disordered children as a group demonstrate an acquisition order similar to normal children's, they also show clinically relevant individual patterns of acquisition. A child's individual acquisition pattern should be combined with information on the normal order of morpheme acquisition to establish an appropriate sequence for remediation.

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