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Grammatical analysis of developmental language disorders: a study of the morphosyntax of children with specific language disorders, with hearing impairment and with Down's syndrome

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Abstract

Using a Dutch adaptation of the *LARSP* procedure by Crystal, Fletcher and Garman (1976) this investigation aimed at two questions: (1) is it possible to discern patterns in the morphosyntax of three groups of language-disordered children: children with specific language disorders, children with hearing impairment and children with Down's syndrome? and (2) can these patterns be related to the clinical characteristics of the children? Analysis of samples of spontaneous speech produced an affirmative answer to the first question. The answer to the second question is that the different clinical characteristics of the children did not so much lead to different kinds of language disorders as to differences in the degree of being language-disordered. The three groups of children showed more commonalities than differences in producing morphosyntax.

Key words: Grammatical analysis, child language disorders.

Introduction

When communicating with language-disordered children, the language production of, for instance, a hearing-impaired child may at first sound quite different from that of a child with Down's syndrome. But over ten years ago, Bloom and Lahey (1978) pointed out the commonalities in language behaviour among children with different aetiologies. They added, however, that there have been contradictory reports in the literature concerning the question of whether a clinical syndrome, such as hearing impairment or mental retardation, can be associated with a particular language behaviour. Therefore more information is needed to be able to judge whether (or not) distinct language pathologies might be associated with different aetiologies.

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We took up this question in the study to be reported and investigated whether it is possible to discern patterns in the morphosyntax of three groups of language-disordered children: children with specific language disorders, hearing-impaired children and children with Down's syndrome. By a *pattern* we mean a series of characteristics in the morphosyntax of a group of language-disordered children in which they differ from normal children. The second question we examined was: where such patterns can be discerned, can they be distinguished from one another in such a way as to show a correlation with the clinical characteristics of the children?

In order to answer the research questions, a model to assess the morphosyntactic level of language disordered children is required. Such a model should be based on normal langauge development. With reference to Dutch, the study of normal language development has been rather fragmentary. For that reason we started our study by developing a model for diagnosing and evaluating language disorders in Dutch children. This model was based on the *LARSP* profile chart developed by Crystal, Fletcher and Garman (1976).

In the next paragraphs we will present our research design, the subjects involved in the study and the method used. The Dutch profile chart will be discussed briefly. Then the results will be presented, followed by the conclusions of this study.

Methods and subjects

In the construction of a profile chart reflecting the morphosyntactic development of Dutch children, our focus was on the age span between one and four years. This period was divided into six stages of six months. At each stage, spontaneous language samples were obtained from twelve children equally divided as to sex and social class (Fig. 1).

The children were selected from playgroups and day-care centres in Amsterdam. The children were audiorecorded for one hour in everyday situations at their homes in the presence of at least one of the parents and two observers. After the transcription of the recordings 100 successive utterances from the eleventh minute of the recording onwards were used for the morphosyntactic analysis. Our notion of utterance was based on the *T*-unit as defined by Hunt (1970). All utterances were analyzed at clause, phrase and morphology level. The morphosyntactic framework we used was based on descriptive Dutch grammars (Gerts, Haeseryn, de Rooij and van den Toorn 1984, Klooster, Verkuyl and Luif 1974, Pollmann and Sturm 1980, Van den Toorn 1979). In order to determine what morphosyntactic structures should be included in the profile chart at a certain stage, we applied two criteria. In the first place the structure should be used by at least 50 % of the population at a particular stage. This criterion, adopted from Wells (1985), takes into account the requirement that the structure be used by the majority of the children. In the second place we applied a criterion of frequency: the median of the frequency with which a structure is used should have a value of at least 1·0. The application of these criteria has yielded the profile chart which will be discussed in the next section.

The speech of the three language-disordered groups was recorded at their schools, while the children were playing with their speech therapist. From each child 100 utterances were obtained for analysis according to the same morphosyntactic framework used for the normal children. According to the speech therapists, the language production level of the selected children did not go beyond that of normal four-year-olds. A further requirement was that their chronological age should be at least 3;6 years. This made it possible to compare the language disordered children

Stage Age	Sex	Socio-economic group		
		lower	middle	upper
Stage I 1;0-1;6	boys girls	2 2	2 2	2 2
Stage II 1;6-2;0	boys girls	2 2	2 2	2 2
Stage III 2;0-2;6	boys girls	2 2	2 2	2 2
Stage IV 2;6-3;0	boys girls	2 2	2 2	2 2
Stage V 3;0-3;6	boys girls	2 2	2 2	2 2
Stage VI 3;6-4;0	boys girls	2 2	2 2	2 2

Figure 1. *Scheme of data collection in normal children.*

with the normal children of stage VI from 3;6 to 4;0 years. Nonparametric statistics were used for the comparison. The Kruskal–Wallis analysis of variance was applied to determine differences between the four groups (normal and language-disordered) and the Mann-Whitney *U*-test was used to determine differences between the normal children on the one hand and each language-disordered group on the other.

The children with specific language disorders all lacked sufficient intellectual or physiological impairment to account for their difficulties in language acquisition. The children ranged from 4;8 to 8;2 years of age; with an average age of 5;11 years. All 18 children (14 boys and 4 girls) attended a school in Amsterdam for children with specific language disorders.

The hearing impaired children (11 boys and eight girls) suffered from sensori-neural or mixed hearing loss. Their hearing impairment had been diagnosed before they were 1;6 years of age. Their hearing loss differed from 40 to 85 dB pure tone average on the better ear. The average hearing loss was 65·8 dB. They differed in age from 3;10 to 9;1 years, with an average age of 5;11 years. The children were of normal intelligence.

The mentally retarded children (seven boys and 11 girls) had all been diagnosed as suffering from trisomy 21—Down's syndrome. Their chronological age ranged from 8;4 to 18;11 years, with an average age of 14;4 years. Their intelligence level determined with a Dutch adaptation of the Merrill–Palmer Preschool Performance Tests, differed from 20 to 56, with an average IQ of 40·7. Their mental age was at least 3;6 years. All but one lived with their parents.

The profile chart

The upper part of the profile chart (Fig. 2) is reserved for general information on the child. The utterances which can not be analyzed morphosyntactically are noted in

name :
date of birth :
date of recording :
age :
therapist :
remarks :

A. Unanalysed

Unintelligible	Incomplete
Deviant	Ambiguous
Minor	Repetitions

B.

Analysed utterances	Total number of utterances
MLU	MLUL

	Clause			Phrase	Word
Stage I 1;0-1;6	Noun	Verb	Other		
Stage II 1;6-2;0	Imper	Inter	Statement		
			SA SV AV	demonstr.pronoun determiner + noun personal pronoun	diminutive 2/3 sing.
Stage III 2;0-2;6	VX	VSX	OV SC SVA AA SAA OAV SVC SVO SVAA SVAO	copula auxiliary adjective + noun prep. + det. + noun prep. + noun	plural 1 sing. adjective-e past part.
Stage IV 2;6-3;0		QXY	VC And OA AAV SVAC 4 +	poss.pron. + noun postmodification det. + adj. + noun interrog.pronoun prep. + pers.pron. adverb + adverb	past tense
Stage V 3;0-3;6		QXYZ	Subordination Coordination	adverb + adjective indefinite pronoun	
Stage VI 3;6-4;0		VSXY		prep. + poss. + noun repl./part.'er'	
	Other			other	other

Figure 2. *The profile chart.*

section A. Some quantitative measures of the child's language production, like MLU and MLUL, are marked down in section B.

Stage I, which covers the period from 1;0 to 1;6 years, is the stage of the one element utterances. We distinguish three kinds of utterances here: the ones with a nominal character (Noun), indicating objects, the ones with a verbal character (Verb), indicating actions and events, and a category—Other–used to indicate properties and function words, et cetera.

In the second stage, from 1;6 to 2;0 years, children have learned how to combine words, both at clause and phrase level. Children of this age in particular combine subjects, verbs and adverbial adjuncts to the clause structures SA, SV and AV. It is noteworthy that children at this stage already use utterances containing three or even four elements, although these utterances did not meet the criteria mentioned above to be included in the profile chart. At phrase level demonstrative and personal pronouns are used, besides combinations of a determiner with a noun. At word level the diminutive appears, as well as the second and third person singular forms of the verb in the present tense.

At Stage III, from 2;0 to 2;6 years, four clause structures consisting of two constituents appear: structures with an object (OV), e.g. *gooien steen* ('throw stone'); structures with a complement (SC) which is in most cases the nominal part of the predicate, e.g. *hond lief* ('dog sweet'); structures consisting of two adverbial adjuncts (AA), like *daar ook* ('there too') and imperatives (Imper) of the type VX, in which V denotes the verb and X any other clause element, like *kom hier* ('come here'). At this stage some three-element utterances (SVA, SAA, OAV, SVC and SVO) and two four-element utterances (SVAA and SVAO) become productive as well. At this stage these clause structures are mostly rather elementary, that is to say, they consist of single words. In the category of interrogatives (Inter), questions of the type VSX appear. At phrase level the use of prepositions can be noted. Constructions consisting of a preposition, a determiner and a noun, e.g. *naar de tuin* ('to the garden') become productive at the same time as those without a determiner, like *naar bed* ('to bed'). The use of copulas is linked with the use of a complement at the clause level at this stage, as in *hond is lief* ('dog is sweet'), resulting in an SVC structure at clause level. Auxiliaries can be found as well. Sometimes these are used in combination with past participles, which are registered at word level at this stage. Adjectives are used in combination with a noun. At word level the inflection of the adjective in Dutch (adjective-*e*) is scored. Other morphemes becoming productive are the plural form of nouns and the first person singular of the verb in the present tense.

At stage IV, from 2;6 to 3;0 years, we see that the children produce the coordinating conjunction *en* (and). The two element utterances VC and OA and the three element utterance AAV meet the criteria set above. Given the use of SVAA at stage III, one wonders why AAV meets the criteria only now. When we take a closer look at these structures, we discover that SVAA structures are of a more elementary character than AAV structures, which are more developed at phrase level. The following examples may illustrate this:

SVAA: *ik kan niet bij*

I can not reach

clause: S V A A

phrase: personal pronoun

AAV: *gaat nu naar de stad*

goes now to the town

clause: V A A

phrase: preposition + determiner + noun

At this stage we can also see utterances with four elements of the type SVAC, e.g. *ik ben ook ziek* ('I am ill too'), and utterances which contain more than four elements, indicated by 4+. Finally, at clause level, children are using wh-questions in utterances with two other clause elements, indicated by QXY. The interrogative pronouns which are used in these questions appear at phrase level in this stage. Possessive pronouns are used in combination with a noun. At this level we also see that the children produce post-modifications, e.g. *de poes met witte pootjes* ('the cat with white feet'), in which *met witte pootjes* is analyzed as post-modification. Children start using phrase structures containing a preposition and a personal pronoun as well. The form of the pronoun in these constructions is the object form, which becomes productive later than the subject form at stage II. Finally noun phrases consisting of a determiner, an adjective and a noun are used, as well as constructions consisting of two adverbs, like *heel snel* ('very quickly'). At word level we see that children between 2;6 and 3;0 years of age produce past tense forms.

At stage V at clause level children between 3;0 and 3;6 years no longer coordinate utterances with And (Stage VI) only, but they also use other coordinating conjunctions, such as *maar* ('but'), *of* ('or') and *want* ('for'). Subordinating conjunctions appear as well, e.g. *omdat* ('because'). We also see the use of question words, now with three other clause elements, indicated by QXYZ. At phrase level indefinite pronouns become productive, as well as structures in which the adjective is modified by an adverb, e.g. *heel groot* ('very big').

At stage VI, between 3;6 and 4;0 years, children produce questions with inversion of verb and subject that contain four clause elements in total, indicated by VSXY. At phrase level we see that the category possessive pronoun plus noun from stage IV is now preceded by a preposition. Finally, at phrase level structures with *er* become productive. In Dutch there are two kinds of *er* to be noted here: one with a partitive meaning, as in *ik heb er twee* ('I have got two of them') and the repletive *er* which introduces an indefinite subject, as in *er zit een poes in de tuin* ('there is a cat in the garden').

Structures which did not meet the criteria to be included in one of the stages are noted in the categories Other/other at the bottom of the profile chart.

Results and discussion

In order to examine the possibility of patterns in the morphosyntax of the three groups of language-disordered children mentioned, we had to give a definition of what we would regard as a *pattern*. We defined a pattern as a set of statistically significant differences in the frequencies of the use of morphosyntactic structures between normal children and language-disordered ones. After applying the Kruskall–Wallis analysis it turned out that 28 of the 63 variables on the profile chart showed a significant difference ($p < 0.05$). Further analysis with the Mann–Whitney U-test were therefore performed in order to find out if any group differences exist ($p < 0.05$). The results of the Mann–Whitney U-tests on the normal children on the one hand and each language-disordered group on the other are represented in Table 1. This table shows in which morphosyntactic categories significant differences were found between two groups. In discussing the results we will not consider the variables from the upper part of the profile chart, with the exception of MLU and MLUL. In total 56 morphosyntactic variables were scored. The children with specific language disorders (SL) differ on 16 items from the normal children (NC). The hearing-impaired children (HI) differ on 22 items from the normal children. But most differences are found between the children with Down's syndrome (DS) and the normal children: they differ on 28 items. In view of this large number of differences our first research question 'Is it possible to discern patterns in the language production of three groups of language-disordered children?' can be answered affirmatively.

We need a method for characterizing patterns, in order to be able to recognize distinct profiles. We will do this by referring again to Table 1. In this table the sign >

Table 1. *Results of the Mann–Whitney U tests: variables in which the normal and language-disordered children differ significantly* ($p < 0{\cdot}05$).

	NC–SL	NC–HI	NC–DS
Clause		MLU <	MLUL <
		MLUL <	MLUL <
		Noun >	Noun >
		Verb >	Verb >
	SA <		
	AV >		
	OV >	OV >	OV >
	SC >		
	VSX <	VSX <	VSX <
			SVAA <
	SVAO <	SVAO <	SVAO <
			VC >
			AAV >
		SVAC <	SVAC <
	4+ <	4+ <	4+ <
	Coordination <	Coordination <	Coordination <
		VSXY <	VSXY <
Phrase			demonstr. pronoun <
	determiner + noun <	determiner + noun <	determiner + noun <
	personal pronoun <	personal pronoun <	personal pronoun <
		copula <	
		auxiliary <	auxiliary <
	poss.pron. + noun <	poss.pron. + noun <	poss.pron. + noun <
		postmodification <	
			det. + adj. + noun <
			interrog.pronoun <
	prep. + pers.pron <		
	prep. + poss. + noun <	prep. + poss. + noun <	prep. + poss. + noun <
	'er' <	'er' <	'er' <
Morphology	diminutive <		diminutive <
		2/3 singular <	2/3 singular <
	1 singular <	1 singular <	1 singular <
			adjective-*e* <
		past tense <	past tense <

indicates that a structure is used more by the language-disordered group than by the normal children. The sign < indicates that a structure is used less by the language-disordered group.

Regarding the clause level of the children with specific language disorders we find that some utterances are used more than normal children would use them: AV, OV and SC. At the same time some other structures are underused: SA, VSX, SVAO, 4+ and Coordination. At phrase level the most striking finding is the problem these children seem to have with the pronominal system. Phrase structures containing personal and possessive pronouns are used less than in the case of normal children. They also show fewer instances of the variables determiner + noun and the repletive and partitive 'er'. With regard to morphology these children use few diminutives and agreement of first person singular.

As for the children with hearing impairment, their MLU and MLUL scores are lower than those of the normal children. At clause level a tendency similar to that of children with specific language disorders can be noticed: some utterances containing a subject are used less than in the case of normal children: VSX, SVAO, SVAC, 4+, VSXY; likewise Coordinations are underused. The variables Noun, Verb and OV, on the contrary, are overused. At phrase level these children also seem to have problems with the use of personal and possessive pronouns. In addition to this, they showed fewer instances of copulas and auxiliaries, which is not surprising, considering the frequently reported findings on underuse of function words by these children (e.g. Brannon 1968, Bamford and Mentz 1979). The categories determiner + noun and repletive and partitive 'er' are also underused. At morphology level we find problems with verb agreement and with the use of the past tense.

In the group of children with Down's syndrome the tendency to use many structures in which the subject is deleted and to use few subject predicate structures is even greater than in the other two groups. We notice an overuse of Noun, Verb, OV, VC and AAV and an underuse of VSX, SVAA, SVAO, SVAC, 4+, Coordination and VSXY. Their MLU and MLUL scores are lower than those of the normal children. Besides problems with personal and possessive pronouns, which we also encountered at phrase level in the other two groups, children with Down's syndrome have poor control over demonstrative and interrogative pronouns. Again, determiner + noun and repletive and partitive 'er' are underused. These children too use fewer auxiliary verbs. At the morphological level as well, these children differ more from the normal children than do the other two groups. The problems experienced here concern verb agreement, declension of nouns and adjectives and the use of the past tense.

If we compare these patterns (Table 2) we find in part 2.1 that there are no less than 11 structures in which the three groups differ from the normal children. Up to this point the patterns of the three language-impaired groups coincide with each other. But there are also structures in which two of the three language-disordered groups differ from the normal children, as in part 2.2.

In part 2.3 we have structures in which only one group of language-disordered children differs from the normal children. But at the point, where the patterns of the three groups seem to diverge, some differences can be related to general tendencies noticed in all three language-disordered groups. The first two tendencies regard the use of subject predicate structures. Utterances consisting of more than three constituents containing a subject, like SVAO or SVAC, are used less frequently by the language-disordered children, whereas utterances with no more than three constituents and, in general, not containing a subject, like OV or AAV, are used more often by

Table 2. *Comparisons between patterns of normal and language-disordered children.*

	NL–SL	NC–HI	NC–DS
2.1	determiner + noun	determiner + noun	determiner + noun
	personal pronoun	personal pronoun	personal pronoun
	OV	OV	OV
	VSX	VSX	VSX
	SVAO	SVAO	SVAO
	1 singular	1 singular	1 singular
	4 +	4 +	4 +
	poss.pronoun + noun	poss.pronoun + noun	poss.pronoun + noun
	Coordination	Coordination	Coordination
	prep. + poss. + noun	prep. + poss. + noun	prep. + poss. + noun
	'er'	'er'	'er'
2.2		MLU	MLU
		MLUL	MLUL
		Noun	Noun
		Verb	Verb
		2/3 singular	2/3 singular
		auxiliary	auxiliary
		SVAC	SVAC
		past tense	past tense
		VSXY	VSXY
	diminutive		diminutive
2.3			demonstrative pronoun
			SVAA
			adjective-*e*
			VC
			AAV
			det. + adjective + noun
			interrogative pronoun
		copula	
		postmodification	
	SA		
	AV		
	SC		
	prep. + pers.pronoun		

the language-disordered than by the normal children. The third tendency concerns problems with the pronominal system. A fourth tendency may be problems with verb conjugation. So if we try to distinguish between these patterns, it seems that the differences between our patterns are mostly of a gradual nature. In all children we found conjugation problems, problems with the pronominal system and with subject predicate structures. But the degree to which different language-disordered groups manifest these tendencies varies from one group to another.

Conclusions

The general language level of each group turned out to be far below that of the normal children from 3;6 to 4;0 years of age. The morphosyntax of the language-disordered groups differed considerably from that of the normal children. All language-disordered children differed on 11 variables from the normal children. When the three patterns of the language-disordered groups are compared, four tendencies in the language production of each group can be observed:

(1) a less frequent use of categories with a subject predicate structure;
(2) a more frequent use of categories without a subject predicate structure;
(3) a less frequent use of pronouns;
(4) less verb agreement.

We also discovered differences in the overall performance of the three groups. In general, the performance of the group with specific language disorders was better than that of the children with hearing impairment, whereas the hearing-impaired children as a whole performed better than the group with Down's syndrome. The variables on which their patterns differed concerned the same structures in which all language-disordered children differed from the normal children. What differs from group to group is the degree to which the language is affected. In other words: the different clinical characteristics of our children did not so much lead to different kinds of language disorders as to differences in degree of language disorder.

Our study confirms the statement by Bloom and Lahey (1978) that, at least as far as morphosyntax is concerned, language-disordered children with different aetiologies show more commonalities than differences. The differences that can be distinguished between different groups mainly concern the degree to which their morphosyntactic development is affected.

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