DOCUMENT RESUME

ED 380 988 FL 022 685

AUTHOR Kukkonen, Pirkko
TITLE Grammatical Complexity of Aphasic Speech.
PUB DATE Aug 93
NOTE 9p.; In: Aulanko, R., Ed.; and Korpijaakko-Huuhka, A. M., Ed. Proceedings of the Third Congress of the International Clinical Phonetics and Linguistics Association (Helsinki, Finland, August 9-11, 1993).
AVAILABLE FROM Department of Phonetics, University of Helsinki, P.O. Box 35, 00014 University of Helsinki, Finland (FIM 50).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Aphasia; Foreign Countries; *Grammar; *Language Processing; Language Research; Language Variation; Linguistic Theory; Literary Genres; *Oral Language; Qualitative Research; *Speech Communication; Statistical Analysis; *Story Telling; Syntax

ABSTRACT

Spoken narratives as a genre usually show literary stylistic features. Written/literary registers are characterized by lexical density whereas spoken/colloquial genres are characterized by the complex combination of simple clauses into clause complexes. It has been observed that when aiming at informationally dense speech, people often hesitate and even commit speech errors, possibly due to time constraints. The present study provides support for the role of processing constraints in explaining stylistic variation. Aphasic subjects often produce longer stories than normal, and the stories show typical failures in trying to produce lexically dense speech under heavy processing constraints. Contain 13 references. (Author)

Proceedings of the Third Congress of the International Clinical Phonetics and Linguistics Association, 9—11 August 1993, Helsinki, (R. Aulanko & A.-M. Korpijaakko-Huuhka, eds.), Publications of the Department of Phonetics, University of Helsinki 39, 99—106.

GRAMMATICAL COMPLEXITY OF APHASIC SPEECH

Pirkko Kukkonen
Department of General Linguistics, University of Helsinki

Abstract

Spoken narratives as a genre usually show literary stylistic features. Written/literary registers are characterized by lexical density whereas spoken/colloquial genres are characterized by the complex combination of simple clauses into clause complexes. It has been observed that when aiming at informationally dense speech, people often hesitate and even commit speech errors, possibly due to time constraints. The present study provides support for the role of processing constraints in explaining stylistic variation. Aphasic subjects often produce longer stories than normal, and the stories show typical failures in trying to produce lexically dense speech under heavy processing constraints.

1. BACKGROUND

Characterizing the complexity of a story is not a straightforward task. Grammatical complexity is intertwined with other types of complexity. From a pragmatic perspective, some details are explicitly mentioned in the story, others are pragmatically implicated or presupposed, and still others are left unmentioned. The unmentioned details are often thought of as self-evident or easily predictable on the basis of everyday knowledge or common sense. However, if too many details are left out, a story can be of a grammatically simple structure, but at the same time very difficult for the listener to comprehend. On the other hand, in addition to the actual details of the described activity, a story may contain information about the speaker's emotions and attitudes concerning the activity. Explicit mention of attitudes and emotions often increases the syntactic complexity of a sentence. However, such syntactic complexity need not render the story more difficult to comprehend. Thus, when analysing the complexity of a story, a number of different kinds of facts ranging from form-based features to lexical, semantic, and functional variables should be taken into consideration. In what follows I will focus on form-based, syntactic complexity. Depending on the theoretical framework, it might be possible to construct different and even contradictory hierarchies of syntactic complexity. The present analysis rests upon the differences between spoken and written language confirmed by previous research.

In the description of deviant speech, reference is often - implicitly or explicitly - made to complexity: it is assumed that deviant speech is simpler than normal speech (e.g., Goodglass & Kaplan 1983, Paradis 1987). This "simplicity" can mean either that the constructions are shorter than normal or that their hierarchical structure is less complex than

normal, meaning that the constituents (at different levels) are simple (Crystal 1987). Simplicity may also mean that there is less variation in the types of syntactic constructions used (Goodglass & Kaplan 1983), rendering such speech syntactically stereotypic and monotonous.

It is claimed that syntax is simple in spoken language as compared to written language. However, according to Halliday (1989) and Biber (1988), different types of complexity can be distinguished: written language is characterized by lexical density, whereas spoken language is characterized by dynamic complexity in the ways in which clauses and sentences are combined to form clause complexes. Halliday (1989) exemplifies this claim with the following expressions, both containing the same information:

Written language:
Investment in a rail facility implies a long-term commitment.

Spoken language:
If you invest in a rail facility, this implies that you are going to be committed for a long time.

Thus, the written utterance consists of one clause with complex noun phrases (NPs). In contrast, the NPs in the spoken utterance are of a simple structure and the information is divided between several clauses. The number of lexical words is the same in both utterances, but there are far more grammatical words in the spoken utterance as compared to the written one.

A conservative explanation for differences between spoken and written language is a stylistic one: the differences are due to the different social norms of spoken and written genres, or of language used in different situations. According to Green (1982), two independent dimensions characterize the distinction: modality (spoken vs. written) and style (colloquial vs. literary). Literary style is characteristic of writing (e.g., memoirs, academic prose, formal essays, novels, and short stories with an invisible, omniscient author), whereas colloquial style is characteristic of speech (e.g., impromptu conversation, service encounters, and relaxed, extended casual conversation). However, colloquial writing (e.g., personal letters, stream-of-consciousness indirect free style) and literary speech (e.g., formal oral narratives and addresses, long re-told stories, pretentious speech) also exist, even if these styles are not that common.

Another more provocative explanation for the differences between colloquial and literary styles makes reference to the processing constraints of speech. It is assumed that colloquial language is lexically less dense because less planning is characteristic of this slipshod genre. The fact that even the most carefully planned and informational spoken genres are produced and comprehended in real-time sets a cognitive ceiling for the syntactic and lexical complexity typically found in these genres (e.g., Chafe 1979, Ochs 1979, Biber 1988).

The planning hypothesis is tested in this paper. It is supposed that if the stylistic differences between written and spoken stories are due to processing constraints, the stories told by aphasic subjects with obvious processing difficulties (e.g., word finding problems) should show more of the features typical of spoken genres than the stories told by non-aphasic subjects. In the aphasic subjects' stories there should be more fillers, more sentence fragments, and more sentences than in the non-aphasic subjects' stories. Furthermore, the sentences produced by the aphasic subjects should be of a simple structure with one-word NPs.

2. DATA

A picture description test (Paradis 1987) was presented to 65 non-aphasic comparison subjects and to 15 aphasic subjects. 60 non-aphasic subjects came from three age-groups; half of them were men, half women (collection of norms for the Bilingual Aphasia Test, Paradis 1987; for more details see Roitto 1990 and Kukkonen 1992). Other non-aphasic and aphasic subjects were accepted on a first come, first serve basis (for more background information, see Kukkonen 1990).

The stories were tape-recorded and transcribed. First, the stories were scored according to the principles of the Bilingual Aphasia Test (Paradis 1987). Eight varibles from this scoring system were analysed in detail: 1. number of utterances, 2. total number of words, 3. mean length of utterance, 4. mean length of the five longest utterances, 5. number of different words, 6. type/token ratio, 7. number of verbs per utterance, 8. number of subordinate clauses.

The syntactic structures in the 80 stories were also analyzed according to the principles of the traditional Finnish grammar. The scoring system proposed by Hakulinen, Karlsson, and Vilkuna (1980) was slightly modified for the present purpose (the classification of adverbials was adapted to the analysis of spoken language, and when analyzing certain constructions a more traditional analysis was preferred over a more "idiosyncratic" one proposed by Hakulinen et al.). Furthermore, the subjects' stories were often short, and only few examples of the categories in this system were obtained. For this reason it was necessary to collapse the analyzed features into a few classes, the most important ones of which were: 1. proportion of main clauses and subordinate clauses, 2. number of relative clauses, 3. proportion of intransitive clauses, 4. proportion of transitive clauses, 5. proportion of copula constructions (predicative, existential, and possessive clauses), 6. proportion of marginal sentence types, 7. proportion of participial and infinitivial constructions. 8. simple predicates consisting of one word, 9. complex predicates consisting of compound tense or chain of verbs, 10. average number of words in the subject NP, 11. proportion of simple subjects (single noun or personal suffix), 12. proportion of complex subjects (e.g., noun + clause, clause, adjective/participle + N), 13. average number of words in the object NP, 14. proportion of simple objects (single noun), 15. proportion of complex objects (e.g., noun + clause, clause, adjective/participle + N), 16. average number of adverbial phrases in a clause, 17. proportion of simple adverbials (single noun), 18. proportion of complex adverbials (e.g., complex NP, phrase, infinitival construction), 19. proportion of "free" adverbials qualifying the whole clause, 20. proportion of adverbials that qualify the verb or are obligatory parts of the sentence type, 21. number of all words (including false starts, corrections, etc.), 22. number of words (excluding false starts, corrections, etc.), 23. number of content words, 24. number of fillers, 25. average number of morphemes in a word. As a result of the collapsion of the syntactic categories into these classes, the analysis was rendered easier to carry out and the results less dependent on the selected scoring system.

The data was subjected to statistical (graphic) analysis. Special attention was paid to the range of normal variation and to the differences between non-aphasic and aphasic subjects.

3. RESULTS OF THE QUANTITATIVE ANALYSIS

There were a few variables that showed obvious differences between non-aphasic and aphasic subjects. First, false starts and corrections as well as fillers were typical features of aphasic speech (Fig. 1), but far from all the aphasics had an exceptionally high number of them. The proportion of sentence fragments or constructions the type of which could not be determined, was also high in aphasic speech. The aphasic subjects with most sentence fragments (Fig. 2) were not the same subjects who had a lot of fillers (Fig. 1) or a lot of false starts and corrections. In the figures, the analysed feature, such as number of fillers, is divided into 10 -

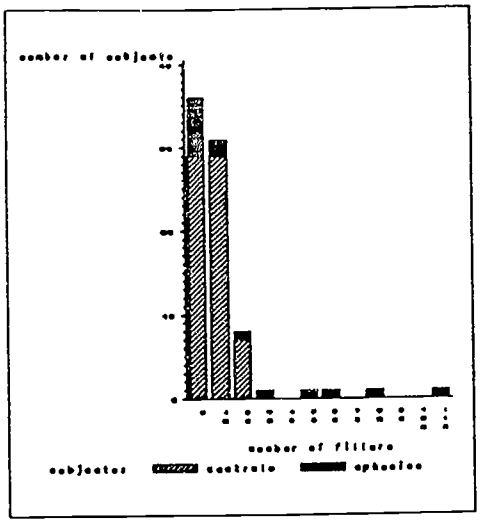

Figure 1.
Number of fillers in the speech samples of 15 aphasic and 65 non-aphasic subjects

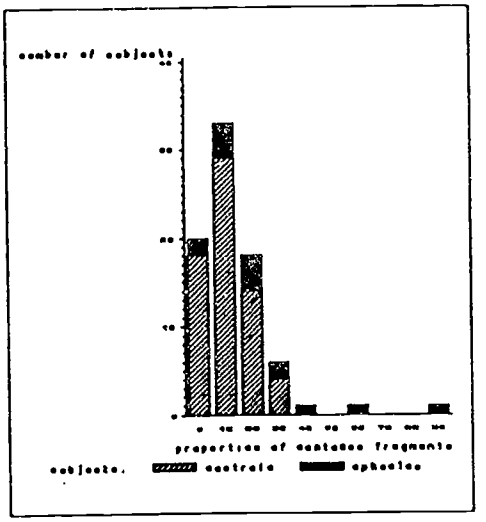

Figure 2.
Proportion of sentence fragments in the speech samples of 15 aphasic and 65 non-aphasic subjects

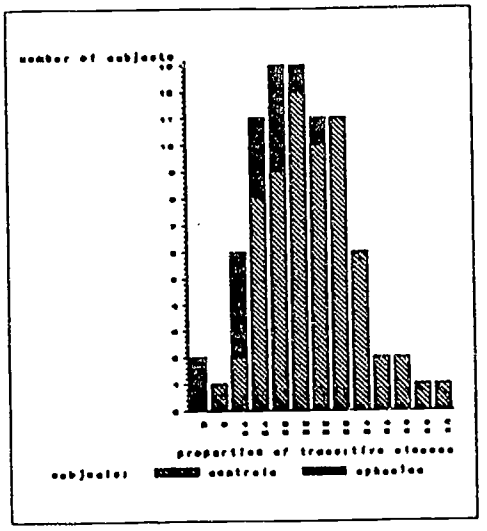

Figure 3.
Proportion of transitive clauses in the speech samples of 15 aphasic and 65 non-aphasic subjects

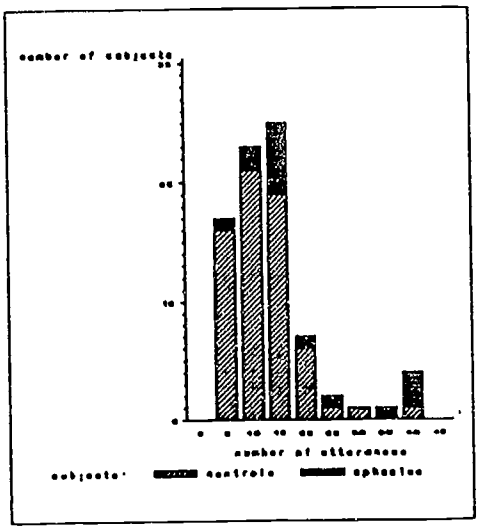

Figure 4.
Number of utterances in the speech samples of 15 aphasic and 65 non-aphasic subjects

15 classes. These classes are represented on the horizontal axis, whereas the vertical axis shows the number of subjects with the indicated number of, in this case, fillers. The histograms were printed with the SAS software system for data analysis using the midpoints option of the chart procedure. For example, Figure 1 shows that all the non-aphasic subjects produced stories with 0-25 fillers whereas 5 aphasic subjects produced stories with more than 25 fillers.

There were four aphasic subjects who did not differ from non-aphasic subjects with reference to grammatical or lexical variables. However, they had a slightly higher number of errors, corrections, and sentence fragments than non-aphasic subjects with stylistically similar stories. A rough statistical analysis does not reveal these differences - they only surface in a finer qualitative analysis (i.e., in the statistical analysis, the stories should be divided into several stylistically motivated groups).

Second, the types of sentence constructions show interesting differences: the proportion of transitive clauses was surprisingly low for all the aphasic subjects (Fig. 3). The aphasic subjects on the average produced subject NPs that consisted of more words than the subject NPs produced by non-aphasic subjects. The object NPs, on the other hand, were more simple in the aphasia data than in the comparison data. Aphasic subjects used more one-word adverbial NPs, whereas non-aphasic subjects used more complex adverbial constructions. The aphasic subjects' adverbs were often sentence adverbs whereas the non-aphasic subjects' adverbs were more tightly linked to the sentence constructions. There were three aphasic subjects who over-used copula constructions (mostly existential and predicative clauses, but also intransitive clauses with 'to be').

Third, there was great variation in story length, which was reflected in the variables 'number of utterances' (Fig. 4) and 'number of words'. The difference was also reflected in the mean length of clauses: the more words, the longer the clauses. The number of subordinate clauses was relatively high for some aphasic subjects with long stories. On the average, the aphasic subjects' stories were longer than the non-aphasic subjects' stories. Less than 5 % of the non-aphasic subjects produced an exceptionally long story, whereas 40 % of the aphasic subjects produced exceptionally long stories.

The quantitative results support the hypothesis that processing difficulties experienced by aphasic subjects may indeed result in colloquial stylistic features. Picture description as a task is a rather formal one and the subjects obviously aim at informational and lexically dense speech. However, especially for aphasic subjects it is difficult to present information in such a dense form, and this results in long utterances with sentence fragments and hesitations. In general, aphasic subjects express the information in more clauses with less content words in each clause. This closely resembles the difference between spoken and written language as described by Halliday and Biber. In order to see whether this is indeed a correct conclusion, extracts from some speech samples were subjected to a more qualitative linguistic analysis.

4. RESULTS OF THE QUALITATIVE ANALYSIS

Samples from the data from five subjects were selected for qualitative analysis. Only extracts corresponding to the third and fourth pictures of the picture series were included in the analysis. Two of the samples were produced by non-aphasic subjects (C1 and C2); C1 had produced an average length speech sample in the comparison group, and C2 the longest speech sample. None of the three aphasic subjects (A1, A2, A3) produced a very short story, but the longest speech sample from the aphasic group was included, together with two samples that were considered representative of average length aphasic speech samples. The shortest aphasic speech sample was "telegraphic" with only one (or a few) words standing for each sentence or utterance. Even the most non-fluent aphasic subjects attempted to produce slightly more utterances that the non-aphasic subjects with the shortest stories. More

information about the selected subjects can be obtained from Kukkonen (1990; key for subject codes: C1=17, C2=16, A1=12, A2=1, A3=13). The following table presents the overall characteristics of the extracts from the five speech samples.

Table 1.
Some characteristics of the extracts from five speech samples subjected to a qualitative analysis.

variable / subject	C1	C2	A1	A2	A3
no. of utterances	5	11	37	13	18
no. of words	17	62	184	67	87
words/utterance	3,4	5,6	5,0	5,2	4,8
shortest utterance	1 word	2 words	1 word	2 words	1 word
longest utterance	5 words	9 words	14 words	8 words	10 words

In the shorter non-aphasic sample (subject C1), there were no hesitations or sentence fragments. The clauses were simple, with only one word NPs, and they were joined by the connectors ja 'and' and sit 'then, next'. In contrast, the longer non-aphasic sample (subject C2) consisted of complex sentences with many relative clauses and other types of subordination. Furthermore, sometimes it was as if the speaker had several ideas in mind simultaneously which he then failed to integrate into a coherent surface syntactic structure. In written language or in highly informational, lexically dense spoken genres all these ideas could be embedded in one complex sentence. Thus, typical of informationally dense spoken genres (Biber 1988), the speaker failed in embedding, probably due to time constraints. Instead of a complex sentence the speaker's attempts resulted in a syntactically fragmented utterance.

The longest speech sample from the aphasia data (subject A1) had certain features in common with the long sample of non-aphasic speech. Both speakers seemed to attempt to produce an informationally and lexically dense story. Also the aphasic subject produced complex NPs such as murtunut oksa 'broken branch', ainakin kaksi tässä olevat linnuista 'at least two of the birds being [sitting] here', or kaikkien tämän tapahtuman silminnäkijänä 'as all of this event's eye-witnesses'. However, for A1 the complex NPs caused problems which were foreign for non-aphasic subjects: there were grammatical errors of agreement in the complex NPs where the agreement was either overgeneralized to, for example, genitive attributes, or where attributes that should have agreed with their heads appeared in the nominative case (for more details, see Kukkonen 1993). Furthermore, A1 aimed at a very detailed description of the pictures, mentioning many details that average non-aphasic subjects left without mention. He payed so much attention to the details that he tended to describe each picture separately rather than form a coherent story out of them. He had paraphasias in his speech, which were often form-based and seemingly detached from the meaning of the items. Other types of word-finding diffulties also resulted in long, empty stretches of speech. These word-finding difficulties were obviously the main (but not the only) reason for the speech sample being abnormally long.

The speech samples of aphasic subjects A2 and A3 were also somewhat longer than the longest non-aphasic speech sample. A2 began his story in a relatively normal manner, but the end of the story consisted of several related ideas that were somewhat repetitive. It remained unclear whether he attempted to combine these related ideas into a lexically more dense structure or whether he was just more repetitive than the other speakers. There were no obvious errors or sentence fragments in his speech sample. A3 had more problems that were

clearly due to her aphasia: she had word-finding difficulties that rendered her speech rather empty and difficult to comprehend. She also made use of leading expressions that seemed to give her more time to find the right words or to fill in the pragmatically inappropriate silence.

5. CONCLUSIONS

The main question was whether the syntactic characteristics of oral stories produced by aphasic and non-aphasic subjects support the hypothesis that the differences between colloquial and literary genres can be attributed to processing constraints. To support the hypothesis the analyses would have to show that aphasic subjects produced longer sentences with more sentence fragments than non-aphasic subjects in a way that could suggest that their difficulty in integrating information in lexically dense syntactic constructions was even more notable than that of non-aphasic subjects.

This hypothesis was supported by the data: aphasic subjects produced long stories with many hesitations and sentence fragments. However, their problems with integrating lexical information did not prevent them from aiming at complex constructions. Also, the major factor behind the lengthiness of aphasic speech samples seemed to be word-finding difficulties due to which aphasic subjects used leading constructions that appeared to give them more time for retrieving the actual content words. Aphasic subjects also used different types of corrections and comments concerning the uncertainty of word choice. Some of the aphasic subjects had such severe word-finding difficulties (and perhaps some other difficulties too) that we cannot claim for certain that the reason their stories were so long only had to do with stylistic factors. However, the longest stories of both the non-aphasic and aphasic subjects showed colloquial stylistic features. These speakers aimed at lexically dense, highly informational speech but did not achieve their goal. This supports the assumption that processing constraints are one factor underlying the stylistic differences between colloquial and literary genres.

It should be noted, however, that the aphasic subjects did not form a homogeneous group. The above analysis shed some light on the problems experienced by many aphasic subjects, including fluent aphasics, but it fails to fully account for the difficulties experienced by non-fluent aphasics with telegraphic speech. It is the aim of the author to try to make the concept of language planning more explicit in the future, and also to try to characterize in greater detail the ways in which clauses are combined into clause complexes in colloquial speech and in different types of aphasic speech.

Acknowledgements

I thank Marjo Roitto for giving permission to use the data she collected from 60 non-aphasic subjects.

References

Biber, D. (1988) *Variation across Speech and Writing* (Cambridge: Cambridge University Press).

Chafe, W. (1979) The flow of thougth and the flow of language. In T. Givón (ed.), *Syntax and Semantics 12: Discourse and Syntax*, pp. 159-181. (New York: Academic Press).

Crystal, D. (1987) *Clinical Linguistics* (London: Edward Arnold).

Goodglass, H. and Kaplan, E. (1983) *The Assessment of Aphasia and Related Disorders* (Philadelphia: Lea & Febiger).

Green, G. (1982) Colloquial and literary uses of inversions. In D. Tannen (ed.), *Spoken and Written Language: Exploring Orality and Literacy*, pp. 119-153. (Norwood, N.J.: Ablex).

Hakulinen, A., Karlsson, F. and Vilkuna, M. (1980) *Suomen tekstilauseiden piirteitä: kvantitatiivinen tutkimus* (Publications of the Department of General Linguistics, University of Helsinki, No. 6. Helsinki).

Halliday, M.A.K. (1989) *Spoken and Written Language* (Oxford: Oxford University Press).

Kukkonen, P. (1990) *Patterns of Phonological Disturbances in Adult Aphasia* (Suomalaisen Kirjallisuuden Seuran Toimituksia 259. Helsinki: Finnish Literature Society).

Kukkonen, P. (1992) *Kaksi- ja monikielisten afaatikkojen kielitaidon arvioinnista ja kuntoutuksesta*. Suomen Logopedis-Foniatrinen Aikakauslehti 1/1992:28-37.

Kukkonen, P. (1993, in press). On Paragrammatism in Finnish. To appear in *Nordic Journal of Linguistics* 16.

Ochs, E. (1979) Planned and unplanned discourse. In T. Givón (ed.), *Syntax and Semantics 12: Discourse and Syntax*, pp. 51-80. (New York: Academic Press).

Paradis, M. (1987) *The Assessment of Bilingual Aphasia*. (Hillsdale, N.J. & London, England: Lawrence Erlbaum).

Roitto, M. (1990) *Kielellinen suoriutuminen normaalisti ikääntyneillä suomenkielisillä* (Unpublished pro gradu -thesis. University of Helsinki).