

Abnormal Syntactic Compensations Utilized by a Patient with Chronic
Broca's Aphasia: Implications for Treatment

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The symptoms associated with Broca's aphasia logically lend themselves to psycholinguistic investigation. In recent years the agrammatic aspects of Broca's aphasia have been given the most attention. Early hypotheses relating to agrammatism centered on the concept of regression (Spreen, 1968). It was posited that the aphasic individual was using a simplified set of grammatical rules, which paralleled the rule systems used by young children in their acquisition of language. However, recent investigations which have focused attention on the aberrant syntactic patterns observed in patient's with Broca's aphasia have not fully supported the concept of regression.

In a recent paper, Gleason, Goodglass, Green, Ackerman and Hyde (1975) showed that the language of the agrammatic was not simply a reduced form of normal expression, but appeared the consequence of an effortful attempt to overcome linguistic handicaps. Highly simplified and often idiosyncratic output consisted to a large extent of compensatory strategies designed to retain fluency, and hide the nature of the deficit. Gleason *et al.* suggested that "all these strategies are used for normal speech, but the sheer preponderance of them in Broca's aphasia gives agrammatism its peculiar quality" (1975, p. 470). They concluded that, in order to understand agrammatism fully, we must look both to the structures utilized by individuals with Broca's aphasia, and to the strategies they employ.

This paper extends these findings by presenting an analysis of the strategies utilized by an individual with chronic Broca's aphasia, who is of particular interest for two reasons: (1) she uses "abnormal" compensatory strategies, in that she has developed strategies which would never be used in normal speech; (2) she is atypical in that she appears to have a special difficulty with verbs, contrary to the pattern of Broca's aphasia in general, in which "the choice of base lexical items remains generally unaffected" (Gleason *et al.*, 1975, p. 469).

In this paper, it is suggested that the patient's strategies can be revealingly described in terms of two levels of structure: an underlying target structure which resembles the output of a normal speaker, and the actual surface output of the agrammatic. These two levels are related by "realization rules" which describe the structural change brought about on the target by the agrammatic patient. Finally, the reasons behind the idiosyncratic speech of this particular patient are discussed, together with the possible implications for therapeutic intervention.

Data Collection

The aphasic subject used in the present investigation was a 42-year-old former elementary school teacher who had received four years of speech-language therapy following a cerebrovascular accident. Speech and language characteristics were consistent with a diagnosis of Broca's aphasia (Goodglass and Kaplan, 1972). A normal subject was used as a control.

Language samples obtained from each subject constituted the data analyzed in this study. Ten stimulus questions were provided for obtaining conversational speech samples, and ten were provided for obtaining expository speech when shown the "Cookie Theft Picture" as a stimulus (Goodglass and Kaplan, 1972).

All subject responses were tape recorded for further analysis. The transcribed data were segmented into utterances and compared with regard to: (1) Length and well-formedness, (2) Syntactic complexity, and (3) Word class usage and lexical repertoire.

Data Analysis

Length and Well-formedness. The number of utterances obtained from each subject in response to the stimulus items differed enormously, with the aphasic subject requiring over four times as many utterances to answer the same questions (39 utterances versus 176 utterances). With regard to length, the normal speaker had a mean length of utterance (MLU) of 12 morphemes; the aphasic subject exhibited a MLU of seven. The number of utterances, together with differences in length, clearly indicate a difference in communicative efficiency between the normal and aphasic speaker.

The utterances were rated for syntactic well-formedness by assigning them to one of three categories: (1) well-formed, (2) incomplete, and (3) ill-formed. The results (Table 1) show that the aphasic subject had a higher proportion of incomplete and ill-formed utterances than did the normal subject. However the ill-formed utterances of the aphasic subject were not, for the most part, random deviations. Considerable proportions were rule-governed, in that they resulted from the application of certain consistent, identifiable compensatory strategies.

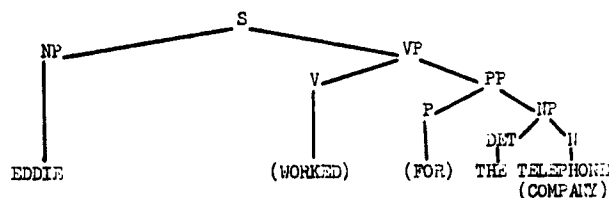
Table 1. The number (and frequency) of normal and aphasic utterances rated as to syntactic well-formedness.

	Aphasic	Normal
Well-formed	110 (63%)	32 (81%)
Incomplete	12 (7%)	2 (6%)
Ill-formed	54 (31%)	5 (14%)

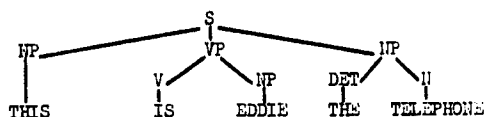
Syntactic Complexity. Utterances of the normal subject were varied in construction and made use of considerable embedding. The aphasic subject, however, appeared bound to certain surface structure realizations and, in particular, repeatedly used the canonical form of Subject-Verb-Object. The aphasic speaker also experienced difficulty with grammatical coordination

The strategy utilized by the aphasic subject could be described formally as a This is insertion rule, placed in an utterance-initial position, with deletion of the target main verb from the basic structure: Noun Phrase-Verb-Noun Phrase. Figure 1 shows derivations employing the This is insertion rule, taken from the aphasic speaker's corpus.

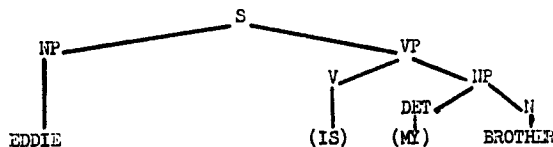
(A) UNDERLYING STRUCTURE



(B) SURFACE STRUCTURE



(A) UNDERLYING STRUCTURE



(B) SURFACE STRUCTURE

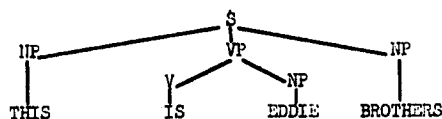


Figure 1. Derivations of "This is Eddie the telephone" and "This is Eddie brothers."

If we treat This is and It was as inserted "dummy" elements, the findings above are consistent with those of Myerson and Goodglass (1972) who reported that Broca's aphasic individuals often have difficulty in encoding Subject-Verb in the same utterance. In the present investigation, however, it seemed that there was not only a difficulty in crossing a constituent boundary, but, more seriously, a fundamental inability to retrieve verbs. This is shown not only by the low number of content verbs used, but also by the fact that the subject tended to overuse those few verbs available to her.

In addition to these replacement strategies, the aphasic subject used repetitions to compensate for her inability to retrieve verbs. In some instances, the aphasic subject used multiply conjoined identical verbs, as in: (1) "I guess the woman is dreaming and dreaming and dreaming," (2) "The girl is laughing and laughing," and (3) "It was mother and mother and mother." Several explanations can be posited to account for reiterations conjoined by and. Goodglass (1976) attributed reiterations to a particular

and subordination. When an utterance consisted of more than one clause, the aphasic subject utilized parataxis, or simple coordination. Indirect discourse was apparently unavailable to her; however, she was able to use direct quotation. The only examples of relativization occurred as part of stereotypic phrases, such as "That's what I mean" and "I don't know what happened." The few superficial examples of noun phrase complementation are possibly better analyzed as introductory "fillers," such as, "I mean," "I want," or "I think," followed by a simple sentence. Consider the example, "I mean Knoxville is home."

Word Class Usage and Lexical Repertoire. Major word classes and lexical data were computed by a type-token count based on the surface structures of all utterances (Table 2). With regard to nouns, the aphasic subject had a comparable repertoire of common nouns to that of the normal subject. However, nouns were used repeatedly in the corpus of the aphasic subject. Likewise the superficial word count of personal pronouns was comparable between subjects. However, the aphasic subject utilized personal pronouns with a far greater frequency and generally as part of nonproductive, stereotypic phrases. Demonstrative pronouns and relative pronouns also tended to occur within stereotypic phrases. The aphasic subject was not observed to utilize any possessive pronouns. Hence, on closer analysis, the aphasic subject appeared deficient in the functional use of pronouns.

The aphasic subject appeared to have sufficient command of adjective forms although they were used repeatedly. The aphasic speaker used adverbial modifiers more often than did the normal speaker, making the total number of adverbs in lexical use disproportionately large. Adverbs such as, "And then" and "Right here" were used repeatedly as stereotypic responses, and seemed to function as introductory starters and sentential fillers. Consider the examples: (1) "And the water is right here in the puddle right here"; (2) "And then that's why it was the heart." Therefore what superficially appears to be adequate command of adverbial modifiers by the aphasic subject is misleading.

The variety of verbs used and the variety of inflectional endings were examined. Superficially, the aphasic subject utilized a large number of verbs in her speech; the total was 215, which is over one per utterance. However, the number of different verb forms used was only 39, and the number of different lexical items was 28. Even this figure is in excess of the number of verbs at her disposal since it includes several items which occur only in stereotyped phrases, such as "wait a minute" and "I don't know." The most commonly used verb was to be which occurred 136 times. Of these, 127 instances were third person singular forms. The unavailability of a base lexical item such as a verb is generally considered unusual (Gleason et al., 1975 p. 469). With regard to other aspects of the verb, however, this aphasic speaker conformed to the typical pattern in that she experienced the expected difficulty with inflections and auxiliaries.

The aphasic subject adopted verb replacement strategies as a device to lower the number of content words needed in a sentence. The strategies can best be understood if they are formalized as "realization rules" which apply to an hypothesized target sentence. This is and It was were frequently inserted into utterances with deletion of the target main verb. Normal speakers would utilize additional content words than those used by the aphasic subject. In the utterances: (1) "And then it was the stroke," and (2) "It was the Margaret Townsend," the context suggests that they be

Table 2. A type-token analysis of the lexical corpus used by the normal and aphasic subjects.

Word class	Total number in lexicon	Number of different items in lexicon	% Occurrence of total output
Nouns			
Normal	89	67	23
Aphasic	173	80	18
Pronouns			
Normal	46	14	12
Aphasic	204	12	21
Verbs			
Normal	103	56	26
Aphasic	215	28	22
Adjectives			
Normal	27	27	7
Aphasic	54	32	6
Adverbs			
Normal	19	16	5
Aphasic	101	20	10
Prepositions			
Normal	40	14	10
Aphasic	10	7	1
Determiners			
Normal	42	2	11
Aphasic	73	2	8
Connectives			
Normal	13	5	3
Aphasic	112	6	12
Others (Quantifiers, Particles, Negatives)			
Normal	11	6	3
Aphasic	23	4	2

interpreted as (1) "Then I had my stroke," and (2) "I worked at the Margaret Townsend camp." This phenomenon seemed to represent a difficulty with verbs, rather than nouns, as additional nouns were frequently tacked on to the this is phrase, as in: (1) "This is Eddie the telephone," or (2) "Well this is bad the cookies."

patient's difficulty in crossing the constituent boundary between noun phrase and verb phrase. This does not appear to be an acceptable explanation for reiterations in the present corpus.

A possible explanation might be that the stereotyped word choices were used in compensation for verb retrieval difficulties. In the case of the examples above, "laughing" may represent a compensation for the verb "watching" in which case, the intent of the utterance might be: "The girl is watching and laughing."

Another possible explanation is that the aphasic subject used repetitions to compensate for her lack of facility in using adverbial modifiers. In this instance, the utterance might be interpreted to mean that the girl was laughing "hysterically" or "heartily." This could also account for the utterance: "It was mother and mother and mother," which could mean that mother was repeatedly ill. This is consistent with her difficulty in using meaningful adverbs as shown in Table 2.

The aphasic subject was deficient in her use of standard prepositional forms. Seven prepositions appeared in her repertoire, but they were not readily used and accounted for only one percent of the verbal output (Table 2). It is clear that the difficulty was not in the conceptualization of relationships between terms, but with the recovery of the surface forms for their expression. In order to avoid using them, the aphasic subject developed an inappropriate strategy of substituting PRONOUN + be in place of a preposition. Viewed this way, the utterance, "This is Charlton Avenue I was born," may be construed as a locative: "On Charlton Avenue I was born," with the preposition taking the form of PRO + V. The superficial structure of the utterance does not suggest the use of a true demonstrative as the subject was not pointing to the street nor a map while producing the utterance.

In the utterance, "And Mother was alright it was Christmas," it was appears to represent the preposition at (Figure 2). These examples were not isolated ones. Overall, this is or it was appeared in place of a preposition on 27 occasions (and it's or this was on four occasions). This seems sufficient to justify setting up an optional, but preferred replacement rule for the aphasic subject of substituting PRO + be in place of a preposition, with PRO + be generally taking the form of this is or it was. PRO + be constructions were preferentially placed at the beginning of a sentence. They occurred at the absolute beginning of an utterance 49 times, and this number rises to 64 if examples of PRO + be preceded by dummy fillers (e.g. "Yeah," "And," "And then") are included.

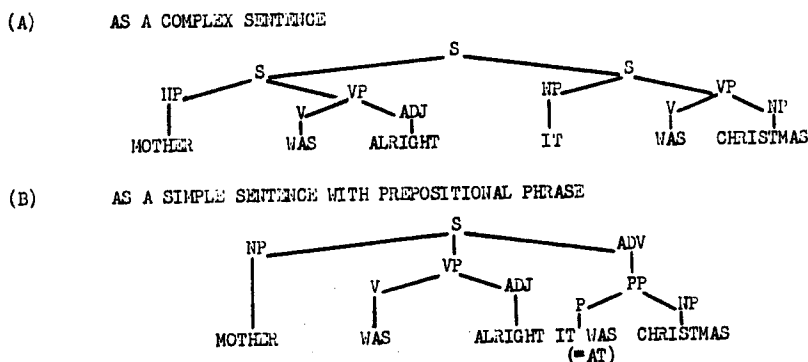
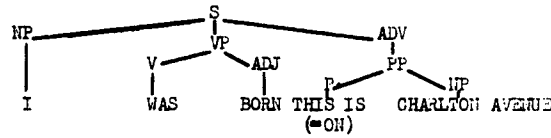


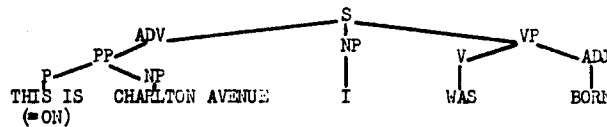
Figure 2. Alternative phrase markers for "And mother was alright it was Christmas."

In a number of instances, then, a superficially odd sentence can be related to a well-formed sentence of English by assuming the application of two idiosyncratic rules: the pronoun replacement rule, and an optional but preferred preposing rule, in which the pronoun replacement is placed in the utterance-initial position. The operation of both rules is seen in, "This is Charlton Avenue I was born," which possibly represents an underlying target sentence: I was born on Charlton Avenue (Figure 3).

(A) UNDERLYING STRUCTURE



(B) AFTER PRO + BE PREPOSING



(C) SUPERFICIAL STRUCTURE

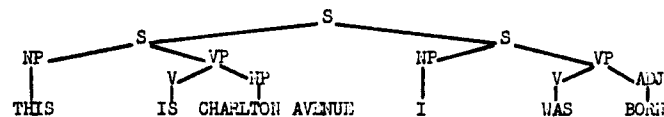


Figure 3. Derivation of "This is Charlton Avenue I was born."

When the operations of preposition replacement and PRO + be preposing are understood, a number of previously strange sentences in the aphasic subject's corpus becomes clearer.

The aphasic subject under discussion is of particular interest because of her idiosyncratic preposition replacement and verb avoidance strategies. These compensatory mechanisms cannot be considered "normal" as many render ill-formed and difficult-to-comprehend utterances. Patients' strategies have implications for psycholinguistic theory and therapeutic intervention. In the early stages of aphasia a patient is likely simply to omit the unavailable words, resulting in the characteristically "telegraphic" style of speech often noted by researchers. A chronic aphasic patient, however, is likely to compensate for these deficiencies by adopting a number of idiosyncratic strategies whose function it is to disguise her problems and maintain fluency. Gleason et al. (1975) suggest that Broca's aphasic individuals tend to use similar strategies, and that these are basically the same as those found in normal speech. The subject in this present investigation does not support this claim.

Traditionally, speech and language therapy for the patient with Broca's aphasia has focused disproportionately on naming activities, utilizing the formula: This is + NP. Many of the materials developed for aphasia therapy reflect this bias (Taylor and Marks, 1959; Keith, 1972). The findings of the present investigation lend little support to such an approach. The subject, now in a chronic stage of the disorder, experiences little difficulty with naming in her verbal output, yet continues to experience difficulty with verbs and functor usage. The patient may have seized on this structure as an easy way of producing acceptable sentences and over-generalized its use to inappropriate circumstances, making her speech ill-formed and difficult to comprehend.

An alternate approach to language rehabilitation for Broca's aphasia, then, might be to base treatment strategies on surface structure representations. These representations might be derived from a corpus of utterances obtained in controlled, expository situations. Deficient syntactic operations which might be derived from such an analysis may often be obscured in standardized aphasia testing. Acceptable surface structure representations which appear to be used inconsistently by the aphasic person should assume the initial focus of the therapeutic intervention. The clinician should attempt to facilitate stabilization of these inconsistent surface structure operations in the aphasic individual in the direction of the standard, adult rules.

Finally, by enhancing not only syntactic operations in the Broca's aphasic individual, but the communicative intentions associated with them, the chronic aphasic individual might have a less limited and much more functional communicative repertoire for language usage.

References

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Discussion

- Q: Perhaps you can clarify what you are saying we should do with patients who have idiosyncratic strategies. I personally feel that these are the most fascinating part of the language of Broca's aphasia. Do you adopt the view that these are clinically useful strategies?
- A: Yes, that is what I was trying to say. If the strategies do get the aphasic speaker's point across and their intentions are conveyed to the listener, then, as clinicians, we should encourage their use and stabilize them if they appear to be used inconsistently. If, on the other hand, they are not comprehensible, perhaps we should help them develop improved strategies that need not be grammatically correct.
- Q: The Gleason study you cited also hypothesized the strategy of substituting stressed for unstressed words and the aphasic speakers' tendency to begin sentences with stressed words. How do your results fit with the Gleason study in this respect?
- A: When Gleason presented her data she was saying that aphasic speakers tended to use a noun in the utterance-initial position as a stressed

word and that often they substituted a noun for a pronoun. What we are seeing is that aphasic speakers generally start with a pronoun, a demonstrative pronoun such as "this" or "that," which would be unstressed, I believe, in the way Gleason would classify it. Therefore we are refuting her results on this point. In addition, our subject started many of her sentences with what we said were introductory starters such as, "And then" and "And," which I do not think anyone would consider as being a stressed word.