

Effects of Linguistic and Extralinguistic Context on
Semantic and Syntactic Processing in Aphasia
(Abstract)

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The purpose of this study was to assess aphasic subjects' ability to use linguistic and extralinguistic context to facilitate the comprehension of literal meanings involving both semantic and syntactic processing. Twenty-two aphasic subjects (9 fluent and 13 nonfluent) were tested. Because the experimental test utilized a forced-choice response paradigm between two pictures, each subject was required to obtain a score of at least 90% on a picture identification screening test.

Table 1 outlines the stimulus conditions used. Semantic processing was tested using simple nonreversible active sentences such as "The man was washing the car. What was the man washing?" Syntactic processing was tested using reversible passive sentences such as "The girl was hit by the boy. Who was hit?" Each sentence type was tested in isolation and in two contextual conditions--a linguistic contextual condition and an extralinguistic contextual condition. The extralinguistic condition consisted of pictures that depicted information similar to that contained in the linguistic contextual sentences.

Table 1. Examples of stimulus items.

Sentence Construction	Isolation	Linguistic Context	Extralinguistic Context
<u>Simple Actives</u> (Semantic)	The man was washing the car. What was the man washing?	The woman has a book. The woman went to the library (restaurant). Where did the woman go?	The boy is dirty. The boy was playing in the mud (pool). Where was the boy playing?
<u>Reversible Passives</u> (Syntax)	The girl was hit by the boy. Who was hit?	The girl is on the ground. The girl was tripped by the boy. Who was tripped?	The boy is wet. The boy was sprayed by the girl. Who was sprayed?
<u>Reversible Actives</u> (Distracters)	The woman helped the man. Who was helped?	The man is holding a bat. The man hit the ball. Which was hit?	The woman is holding a pencil. The woman drew the girl. Who was drawn?

For the reversible passive sentences, the contextual sentences and pictures were designed to predict the appropriate subject/object relationship such as "The teacher has a black eye. The teacher was hit by the boy. Who was hit?" Each contextual sentence was a simple active sentence and the given-new relationship between the contextual and target sentences was always maintained. One aspect of structuring the stimuli in this manner is that a nonlinguistic strategy could be employed such that the subjects might simply select the topic noun from the contextual sentence as the response. To measure subjects' use of this strategy and to provide distractor items to help reduce the probability of this strategy, a third condition was employed consisting of reversible active sentences. Use of this nonlinguistic strategy would lead to incorrect responses in the reversible active sentences and thus should generate poorer performance in contextual condition compared with no context condition.

For the simple active target sentences, the context was designed to accentuate the semantic intent of the target sentence's verb or object, such as "The girl has a key. The girl opened the door. What did the girl open?" To reduce the potential influence of semantic relatedness, foils were selected that were not closely related.

All subjects were also administered the yes/no questions from the Minnesota Test for the Differential Diagnosis of Aphasia and the Complex Ideational Materials subtest from the Boston Diagnostic Aphasia Examination. In addition, the subjects were divided into high and low comprehension groups based on their performance in the no context experimental condition. Ten subjects were in the high comprehension group and twelve were in the low.

Statistical analysis (ANOVA) revealed that fluency was not a significant factor. However, there was a significant three-way interaction between comprehension level, sentence construction, and contextual condition. Subsequent comparisons of individual means revealed that linguistic and extralinguistic context facilitated comprehension of both simple active and reversible passive sentences for low comprehension subjects only (the extralinguistic context with reversible passives condition fell just shy of significance).

These results suggest that linguistic and extralinguistic context can improve both semantic and syntactic processing by aphasic persons. This is consistent with the view that pragmatic skills are generally unimpaired in the aphasic population, because one aspect of pragmatic competence is the ability to integrate information from different sources to generate a unified understanding of the communicative intent of spoken messages.

The results of this study were basically similar for both linguistic and extralinguistic context. This suggests that aphasic subjects can pull similar information from both sources. The ability of aphasic patients to use extralinguistic context to facilitate the comprehension of literal meanings suggests that the wealth of information that occurs in the natural surrounding environment may have a marked impact on aphasic subjects' comprehension accuracy.

DISCUSSION

Q: I get the impression that you don't believe your statistics. That you interpret differences as being meaningful even though they were not statistically significant.

- A: The statistics indicated that the context condition was significantly facilitatory for the low comprehension subjects, although it was not for the high comprehension subjects.
- Q: Could you clarify the breakdown between fluent and nonfluent subjects? Was severity taken into account?
- A: In the study, we performed three analyses of variance. In the first analysis we divided the subjects based on fluency. The referring speech pathologist indicated the fluency of subjects and a conversational sample was also recorded and listened to by an additional speech pathologist to verify the classification. We also performed two more analyses which were based on comprehension level of the subjects. Subjects were divided based on their scores on the Boston and Minnesota subtests, and also on their scores on sentences in the no-context condition on the experimental test. There was no absolute severity score. They were divided into high vs. low comprehension subgroups around the mean scores of the subjects. Those scoring above the mean were labeled high-comprehension subjects, and those scoring below the mean were the low-comprehension subjects.
- Q: How did these two variables interact - - - comprehension and fluency?
- A: There were no significant interactions with regard to fluency. However, we did not perform an analysis in which both the comprehension and fluency variables were combined in a single analysis, because we felt the group size would be too small to be meaningful. We did individual analyses in which fluency was used as the between-subjects factor, and there were no differences there. As mentioned previously, we did an analysis in which subjects were divided based on performance on the Boston and Schuell, and also did another analysis where they were divided based on the no-context experimental condition. The results were essentially the same for both cases.
- Q: I'm a little confused about fluent vs. nonfluent. Could you describe what types of aphasic subjects you used, using the Boston classifications of Global, Conduction, Wernicke's, Anomic, Broca's, etc., and which types comprised your nonfluent group. I think your mix might have a strong influence on whether you find differences based on fluency.
- A: Our fluent subjects consisted of Wernicke's, Conduction, and Anomic aphasic subjects, and the nonfluent consisted of Broca's and Global aphasic subjects. They were not administered a standardized test to assess fluency. This was the classification which was given by the referring speech pathologist and which was verified by the conversation sample.
- Q: Could you expand upon your description of what the task was in the extralinguistic context condition? Did you use pictures? What did you typically say to the patient?
- A: In the extralinguistic context condition, we presented the appropriate black and white line drawing. The picture was presented and the patient was told to look at the picture. Then the picture was removed and the target sentence was presented auditorily. Next, the two-picture foils were presented and the patient was asked a question and was required to point to the correct response.

Q: You mentioned you had Global patients. I imagine they were in the low-comprehension group.

A: Yes.

Q: Could you tell us a little bit how they performed on the test?

A: They were all required to pass the picture identification screening task. They all correctly identified 9 out of 10 pictures which were used in the experimental test. Based on the fact that we basically divided the subjects based on their performance on the no-context condition, many of the subjects in the low-comprehension subgroup were not Global patients.

Q: But you did include Global patients?

A: Yes, those that were able to pass the screening test. So these were typically Global patients who had been in therapy for a while and whose comprehension had improved substantially.

Comment: I would imagine we have a different definition of what a Global aphasic subject is.