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Asyntactic thematic role assignment by Mandarin aphasics: A test of the Trace-Deletion Hypothesis and the Double Dependency Hypothesis

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Abstract

This study examines the comprehension patterns of various sentence types by Mandarin-speaking aphasic patients and evaluates the validity of the predictions from the Trace-Deletion Hypothesis (TDH) and the Double Dependency Hypothesis (DDH). Like English, the canonical word order in Mandarin is SVO, but the two languages differ in that the head noun precedes the relative clause in English, but it follows the relative clause in Chinese. According to the Default Principle as stated in the TDH, the word order discrepancy will make subject relative clauses more difficult to comprehend for Mandarin agrammatics than object relative clauses, but the DDH predicts that agrammatic patients from the two languages have the same pattern of selective deficits. The results of this study support the prediction of the TDH.

Keywords: Aphasia; Agrammatism; Comprehension; Mandarin Chinese; Trace-Deletion Hypothesis; Double Dependency Hypothesis

1. Introduction

This study aims to examine Mandarin Chinese-speaking aphasic patients' comprehension on various types of sentences in order to investigate the validity of the predictions from two linguistically based hypotheses—the Trace-Deletion Hypothesis (TDH) and the Double Dependency Hypothesis (DDH). In neurolinguistic literature, the term "agrammatism" was initially used to refer to a selective disorder of speech production (i.e. sparse verbal output, disfluency, and omission of functional morphemes) but intact comprehension resulting from focal brain damage. Since Caramazza and Zurif's (1976) seminal work, this traditional view has been challenged, and more and more cross-linguistic studies have revealed that the comprehension of these patients may also be impaired, especially when the crucial cues to interpret the sentences are syntactic (e.g. for English, Heilman & Scholes, 1976; Schwartz, Saffran, & Marin, 1980, among many others; for German and Italian, Bates, Friederici, & Wulfeck, 1987; for Japanese, Hagiwara, 1993; Hagiwara & Caplan, 1990; for Mandarin Chinese, Su & Law, 1993; for Serbo-Croation, Lukatela, Shankweiler, & Crain, 1995; for Spanish, Beretta et al., 2001; Miera & Cuetos, 1998; for Cantonese, Law & Leung, 1998, 2000; for Hebrew, Friedmann, 2000; for Korean, Beretta et al., 2001; O'Grady & Lee, 2001, 2005). In the past three decades, various approaches have been proposed to account for agrammatic comprehension difficulties, including the phonological/morphological component deficit approach (e.g. Kean, 1977; Bradley, Garrett, & Zurif, 1980) and the complete loss of syntactic competence approach (e.g. Caramazza & Zurif, 1976; Caplan & Futter, 1986). However, these two approaches run into difficulties in the face of evidence that (1) comprehension deficits and telegraphic production may not necessarily co-occur (e.g. Miceli, Mazzucchi, Menn, &

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Goodglass, 1983), (2) these patients are aware of the meaning and the presence/absence of many functional morphemes in well-formedness judgment tasks (e.g. Linebarger, Schwartz, & Saffran, 1983; Lukatela, Crain, & Shankweiler, 1988), and (3) they show a word position effect like normal adults do in an on-line processing task (Shankweiler, Crain, Gorrell, & Tuller, 1989). In the current study, we will focus our discussion on accounts that posit partial loss of certain aspects of syntactic processing as the locus of agrammatic comprehension difficulties. This was the position first taken by Grodzinsky (1986, 1990, 1995).

Based on the syntactic theory (i.e. Government and Binding theory) of Chomsky (1981), Grodzinsky (1986, 1990) proposed the Trace-Deletion Hypothesis to account for agrammatic patients' chance-level performance in comprehending sentences with non-canonical Theme–Agent order as in (1), in contrast to their (near) normal performance on sentences with canonical Agent–Theme order as in (2).

(1) a. Passive: *The cat* was chased [*t*] by the dog.
b. Object-extracted relative: *The cat* that the dog chased [*t*] was small.
c. Object cleft: It was *the cat* that the dog chased [*t*].

(2) a. Active: The dog chased the cat.
b. Subject-extracted relative: *The dog* that [*t*] chased the cat was big.
c. Subject cleft: It was *the dog* that [*t*] chased the cat.

According to the TDH, syntactic representations in agrammatism are intact except in the following two respects (Grodzinsky, 1990, p. 97).

(3) The S-structure representation underlying agrammatic comprehension lacks traces. In interpretation, a Default Principle is invoked that is defined as follows: If a lexical NP has no theta-role (that is, it is in a non-thematic position), assign it the theta-role that is canonically associated with the position it occupies, unless this assignment is blocked. In this case assign it a role from the next lower level in the Thematic Hierarchy.

Based on the TDH, none of the moved elements (i.e. *the cat* in (1a–c) and *the dog* in (2b and c)) in passives, relative clauses, and cleft sentences in (1) and (2) can receive thematic roles because there are no traces to transmit the roles to the NPs. Since these moved NPs are in a position that precedes another NP in the clause, they are assigned the agent role based on the Default Principle. The assignment results in conflicting representations for the sentences in (1) as the other NP receives the agent role via either the preposition *by* or the verb. The chance-level performance is the consequence of guessing between the two NPs, both of which now bear the agent role. For the sentences in (2), the assignment of the Default Principle causes no problems because the non-moved NPs receive the theme role through the verb, and hence the representation matches the correct interpretation of the sentences.

Although agrammatic aphasic patients have been shown to demonstrate selective comprehension deficits on some constructions but not others, several studies also exhibit that they nevertheless can accurately judge the grammaticality of the constructions they fail to comprehend (Linebarger, 1989, 1990; Linebarger et al., 1983; Lukatela et al., 1988; Schwartz, Linebarger, Saffran, & Pate, 1987; Shankweiler et al., 1989). Take the active and passive sentences in (4) as examples. Linebarger (1989) found that agrammatic patients were able to discriminate the grammatical sentences from the ill-formed ones (4a and c) with a passive participle followed by a direct object.

(4) a. *John was finally kissed Louise.
b. The boy was followed by the girl.
c. *The boy was followed the girl.
d. The boy was following the girl.
e. John has finally kissed Louise.

In addition, agrammatics also preserved the ability to correctly judge constructions involving Wh-movement (as in (5)) and empty elements (as in (6)), which demonstrated that chain formation was intact in agrammatics.

(5) Wh-moved subcategorization (83.1% correct)
a. *The principal frowned the boy.
b. *Who did the principal frown?
c. Why did the principal frown?

(6) Empty elements (83.7% correct)
a. Frank thought he was going to get the job.
b. *Frank thought __ was going to get the job.
c. That's who Frank thought __ was going to get the job.
d. *Who __ thought __ was going to get the job?

However, there still exist some conditions which elicited relatively higher error rates[1] from patients' grammaticality judgments, such as the agreement between the subjects or the auxiliary verbs of a tag question and its host sentence, as shown in (7).

(7) a. *The little boy fell down, didn't it?
b. *John is very tall, doesn't he?

Other judgment tasks which caused difficulty for agrammatic patients also involve some kinds of agreement as well, e.g. Wh-head agreement (as in (8)), head–head agreement (i.e. misselection of auxiliaries as in (7b) and (9)), violations of gender or number in pronouns and reflexives (as in (10)).

[1] The agrammatic patients tended to over-accept the ill-formed sentences in these conditions.