

‘To be’ or not ‘to be’: An analysis of copula omission in patients with Broca’s aphasia.

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Introduction: Broca’s aphasia has been widely associated with impairments with functional words and complex sentences (Garraffa & Fyndanis, 2020). Utterance errors of people with Broca’s aphasia (PWBA) are thought to reveal processes behind these impairments. Friedmann and Grodzinsky (1997) discovered an irregular pattern of inflectional construction; tense errors were prevalent whilst agreement was correctly formed. This led to the Tree-Pruning Hypothesis (TPH) postulating it is the syntactic location of the inflectional head within IP which determines its condition; nodes of Tense and CP are damaged whilst Agreement remains unaffected. Investigations of the TPH on English PWBA are rare as their inflectional paradigms are problematic to separate tense and agreement. Therefore, this study investigates the TPH on English speakers by taking a modified approach. The analysis presented focused on copula *be* productions by PWBA collated from AphasiaBank transcripts (MacWhinney et al., 2011).

Comprehensive investigations of copula *be* are non-existent in aphasiology studies, but previous grammatical explanations have been proposed for the omission of the copula in child language. In this study, we borrow an argument from Becker (2002), who proposes it is the predicate-dependent inclusion of an Aspect Phrase (AspP) projection which correlates with copula deletion. Following Carlson (1977), copula predicates can vary between: (1) individual-level (IL), those which encode fundamental, integral features (e.g. *be tall*) and (2) stage-level (SL), those which insinuate temporal or geographical impermanence (e.g. *be tired*). According to Becker (ibidem), these differ in syntactic composition: stage-level predicates project AspP, individual-level predicates do not. In her analysis, a contrast between the Temporal Anchoring process in children and adults is considered. In line with Guéron and Hoekstra (1995), Temporal Anchoring refers to a binding mechanism between a temporal, functional head, and a Tense Operator, positioned in the CP projection (Becker, 2002). Therefore, the ungrammatical deletion of copulas in the context of stage-level predicates may be licit for children under AspP-binding as it is the aspectual property of the predicate itself which embodies temporal anchoring in the absence of the copula. If Becker is correct in assuming AspP is syntactically projected in SL predicates, it seems pertinent to consider whether PWBA present binding comparable to that of children because of impaired Tense. Therefore, if AspP is authorized to execute a function ordinarily carried out by Tense Phrase, it seems plausible to suggest PWBA implement AspP-binding to discard Tense entirely. An interrelation between Becker’s proposal and the TPH could be realized through their cartographic disposition.

The aim of this study is to analyze copula use of PWBA to investigate the TPH in modified approach using Becker’s (2002) proposal. *Is there an absence of agreement errors indicating its syntactic preservation? To what extent does the predicate type determine the presence or absence of the copula? Is there a relation between subject category and copula omission?* Tense impairments are also expected to affect the subject DPs. Case cannot be assigned to subjects where copulas are absent or where Tense is damaged causing non-finiteness (Baker, 2013); null subject utterances are expected alongside copula omission because of impaired Tense.

Method and Results: This study analyzed 195 contexts of the copula *be* within spontaneous utterances produced by PWBA. Overtness was aided by the set Protocol structure (MacWhinney et al., 2011). All subjects of the copula predicates were categorized either as: a full determiner phrase (DPs), pronoun or null and coded for person and number. A 22% copula omission rate was reported across the total 195 *be*-contexts. A two-way ANOVA revealed a significant main effect of predicate type ($F=26.41$, $p<.001$) and subject type ($F=21.32$, $p<.001$) and no interaction ($p=.36$). The analysis confirms that the distribution of copula omission is dependent upon predicate category with rates of copula omission greatest in SL predicates: 33% copula omissions were present in SL predicates (39/120) whilst only 5% copula omissions were observed in IL predicates (4/75). An analysis of copula omission by subject type also reveals that *be* was deleted most frequently where the subject was a full DP: 34.8% (32/92) of full DP constructions contained a null copula. Despite being the most frequently used subject type, only 5.2% of pronominal subjects occurred in null copula contexts (5/97), whereas all null subjects co-occurred with null copulas (6/6).

Discussion: The purpose of this study was to investigate the validity of the TPH through analyzing copula production by English PWBA. Becker's (2002; 2004) proposal, postulating a grammatical basis for copula absence in child English, provided a novel framework to investigate the presumed Tense impairments in the syntactic tree of PWBA. The results of this study appear to substantiate the TPH, with an overall omission rate of 33% in SLs and 5% in ILs. A further research question considers a relationship between the subject category and copula omission. It was hypothesized that the non-finite predicates would pose an issue for nominative Case assignment of the subjects. 50% of the null subjects were interpreted as the non-overt pronoun *I*, whilst the latter, the pronoun *it*. Interestingly, 60% of these instances demonstrate incorrect Case assignment (e.g. *me fine*). It is evident that these pronouns are assigned accusative Case where nominative Case is fundamental; this seems due to the non-finite status of the copula initiating flawed Case assignment.

Conclusions: Overall, these findings confirm postulations made by the TPH as Tense can be proven impaired, not only through verbal absence, but also through the grammatical consequences of incorrect Case assignment. However, further analyses of the participants' CP production appear fundamental for validating the TPH as it could be that the syntactic impairment does not extend beyond Tense.

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