Matrix Relationship Theory

I. Introduction

This paper explores sentences with two clauses and attempts to better understand how embedded clauses are structurally related to higher clauses. I conclude that clauses within the same sentence are either in a matrix relationship with each other or they are independent of each other. Clauses that are in a matrix relationship have a predictable structure between the embedded clause's CP and the higher clause's verb. If the structure does not exist, a matrix relationship does not exist, and the clauses are assumed to be independent of each other.

Section II, the theoretical framework section of this paper, outlines how clausal structure is broadly interpreted throughout the text, identifies why clauses are either open or closed, and introduces a referencing system to identify specific clauses in sentences with multiple clauses.

Section III, the analysis section of this paper, identifies the predictable structure that exists between clauses in a matrix relationship. This paper uses the word 'exists' because I make no attempt to claim how a matrix relationship structure surfaces from a cognitive process; I only attempt to show that the structure is required.

Section IV, the consequences section of this paper, posits that matrix relationships constitute the necessary conditions for filler extraction in complex noun phrases. The filler cannot be grammatically extracted in sentence 1 because the clauses lack a matrix relationship. The filler can be grammatically extracted in sentence 2 because the clauses are in a matrix relationship. If a matrix relationship does not exist, a filler cannot be extracted.

1. *What did Simon spread the rumor that they started ___?
2. What did the captain give the command to start __?

(Hofmeister and Sag, 2010, p. 371)

Section V, the discussion section of this paper, compares the Matrix Relationship Theory (MRT) to Chomsky's Barriers Theory (*Barriers)* and Hawkins's Filler-Gap-Complexity Hypothesis (FGCH). I conclude that MRT is the best proposal for predicting filler extraction; it explains complexity and works out-of-the-box. We will return to these thoughts later in the paper.

II. Theoretical framework

I will broadly interpret clausal structure as [CP [IP YP]. This broad interpretation supports more narrow interpretations of clausal structure:

- Adger: [C>T>(Neg)>(Perf)>(Prog)>(Pass)>v>V] (Adger, 2003)
- Chomsky: [XP[(EA) H YP] (Chomsky, 2000, p. 103)

In "Minimalist Inquiries," Chomsky (2000) posits that a clausal structure with finite T "is a closed system with regard to Case/agreement properties, determined internally without outside effect" (p. 103). Therefore, if the head of IP is finite T, I will annotate the clausal structure as [CP-closed [IP YP]]. If the head of IP is defective T, I will annotate the clausal structure as [CP-open [IP YP]].

When referencing clauses, I will always refer to the most embedded clause as n=1. The next highest clause will always be n+1. Therefore, the clauses in sentence 3 can be referenced as:

3. [CP [IP Bill claims [CP that [IP Sarah believes [CP that [IP Susan thinks [CP that [IP John bought a ring]]]]]]]].

References:

[CP that [IP-closed John bought a ring]]]]]]] = Clause 1

[CP that [IP-closed Susan thinks = Clause 2

[CP that [IP-closed Sarah believes = Clause 3

[CP [IP-closed Bill claims = Clause 4

Using the theoretical framework above, we can revise sentences 1, 2, and 3 as sentences 4, 5, and 6, respectively. Sentence 6 will not be revised with four clauses, as shown in sentence 3. I will revise sentence 6 with two clauses because this paper only examines structural relationships in declarative sentences with two clauses.

4. [CP-closed [IP Simon spread [$_{NP}$ the rumor [$_{CP\text{-closed}}$ that [$_{IP}$ they started a fight]]].

5. [CP-closed [IP The captain gave [$_{NP}$ the command [$_{CP\text{-open}}$ [$_{IP}$ to start a fight]]]

(Hofmeister & Sag, 2010, p. 371, 20a and 20c").

6. [CP-closed [IP Susan thinks [CP-closed that [IP John bought a ring]]]]

(Sprouse, 2012, pp. 82-83).

III. Analysis

I conclude that a matrix relationship does not exist between clause 1 and clause 2 of sentence 4, but does exist between clause 1 and clause 2 of sentences 5 and 6. The structural requirements for a matrix relationship are outlined below:

Matrix Relationship Requirements

Structural requirement between two closed clauses

For a matrix relationship to exist between a closed embedded clause and a closed higher clause, the CP of the embedded clause must be the sister of the higher clause's verb. There can be no intervening phrase, such as an NP, between the verb of the matrix clause and the CP of the embedded clause. This rule explains why sentence 4 does not have a matrix relationship, but sentence 6 does: sentence 6 maintains a sisterhood relationship.

Structural requirement between an embedded open clause and a higher closed clause

For a matrix relationship to exist between an embedded open clause and a higher closed clause, the embedded clause must be c-commanded by the higher clause's verb. The intervening NP in sentence 5 does not interfere with this loose c-command requirement and a matrix relationship is established. The complex NP only interferes with a strict sisterhood relationship between two closed clauses.

Here, we have a better understanding for why NPs are complex in filler-gap-dependences (FGDs); NPs have the ability to interfere with a structural relationship. It is not the case that NPs are inherently complex. Sentence 5b-d show that grammatical judgments do not change as the NP becomes more or less definite. Here, NPs are only complex when intervening in the structure of matrix relationships.

5b. [$_{\text{CP-closed}}$ [$_{\text{IP}}$ The captain gave [$_{\text{NP}}$ the command [$_{\text{CP-open}}$ [$_{\text{IP}}$ to start a fight]]].

5c. [$_{\text{CP-closed}}$ [$_{\text{IP}}$ The captain gave [$_{\text{NP}}$ a command [$_{\text{CP-open}}$ [$_{\text{IP}}$ to start a fight]]].

5d. [$_{\text{CP-closed}}$ [$_{\text{IP}}$ The captain gave [$_{\text{NP}}$ some command [$_{\text{CP-open}}$ [$_{\text{IP}}$ to start a fight]]].

This paper proposes that matrix relationships have a predictable structure. Further research will look to see if structural requirements change in sentences with interrogative CPs. For now, we can assume that the structural requirement is determined by the finiteness of T. Below are some general principles that I expect to remain constant in future work:

- In the context of a sentence, embedded non-finite clauses are always in a matrix relationship.
- Embedded finite clauses have a stricter structural requirement than non-finite clauses.

IV. Consequences

One can test to see if a matrix relationship exists between two clauses by employing a **filler-gap-dependency (FGD) test**. Sentences 7, 8, and 9 are the FGD counterparts to sentence 4, 5, and 6, respectively. The filler cannot be extracted grammatically in sentence 7, because clause 1 and clause 2 lack a matrix relationship. The filler can be extracted in sentence 8 and 9, because the clauses maintain a matrix relationship.

7. *[$_{\text{CP-closed}}$ What did [$_{\text{CP-closed}}$ [$_{\text{IP}}$ Simon spread [$_{\text{NP}}$ the rumor [$_{\text{CP-closed}}$ that [$_{\text{IP}}$ they started __]]]]]]]?

8. [$_{\text{CP-closed}}$ What did $_{\text{CP-closed}}$ [$_{\text{IP}}$ the captain give [$_{\text{NP}}$ the command [$_{\text{CP-open}}$ [$_{\text{IP}}$ to start __]]]]]]]?

9. [$_{\text{CP-closed}}$ What did [$_{\text{CP-closed}}$ [$_{\text{IP}}$ Susan think [$_{\text{CP-closed}}$ that [$_{\text{IP}}$ John bought ___]]]]]].

V. Discussion

There are two alternate proposals in the primary literature that identify the conditions necessary for filler extraction: Chomsky's *Barriers Theory* and Hawkins's *Filler-Gap-Complexity Hypothesis (FGCH).*

Chomsky's *Barriers* claims that "XPs act as barriers to movement or extraction, specifically XPs that are not theta-governed" (Hofmeister & Sag, 2010, p. 371):

> Dependencies [fillers] that cross zero barriers are thus 0-subjacent and should sound perfectly acceptable, '1-subjacency' should translate to marginal acceptability, but anything higher [than 1-subjacency] 'should yield a considerable decrement in acceptability.' (Hofmeister & Sag, 2010, p. 371)

Barriers claims that extraction cannot occur grammatically in sentence 7 because the filler has to cross two barriers: the inherent CP barrier and a transformed IP barrier. Here, Chomsky claims that the tensed island changes the IP blocking category to a barrier.

Processing advocates criticize this approach because the grammarian does not have to prove why the tensed island in sentence 7 changes a blocking category to a barrier. Homeister & Sag claim:

> [*Barriers* exhibits] a pattern of asserting without argument that counterexamples [such as a tensed island] are 'special' or 'exceptional" and therefore "Perhaps nothing beyond considerations of elegance and good taste stand in the way of a grammarian. (Hofmeister & Sag, 2010, p. 370, p. 402)

The problem with *Barriers* is that the theory does not work 'out-of-the-box.' The theory creates a framework for subjacency with an inherent CP barrier, but it does not

provide further insight on the conditions that change blocking categories to barriers. Here, the theory cannot predict anything more than 1-subjacency. Out of the box, it predicts every sentence to be marginally grammatical and only after the grammarian can change the blocking category to a barrier. The theory lacks transparency.

Hawkins posits the Filler Gap Complexity Hypothesis to make the simple claim that languages prefer less complex structures.

> **Filler-Gap Complexity Hypothesis:** If an FGD of complexity n on a complexity hierarchy H is grammatical, then FGDs for all less complex variables on H (n-1) will also be grammatical (Hawkins, 1999, p. 252).

Here, acceptability decreases as complexity increases. In this hierarchical approach, Hawkins claims that filler extraction is dependent on the environment of the FGD: "infinitival phrases are most hospitable to gaps, that finite subordinate clauses are more resistant, and complex NP environments are most resistant of all." (Hawkins, 252).

Hawkins also proposes that acceptability decreases as the number of nodes within an FGD increase. An increase in nodes equals an increase in complexity.

> **Minimize FGDs:** The human processor prefers FGDs to be as small as possible (251).

Based on the proposals above, Hawkins (1999) posits that sentence 11 is less acceptable than sentence 10, because sentence 11 has more complex structures.

10. Who did you hope that you would see ___? (Hawkins, 1999, 34a,)

11. *Who did you know the professor that taught ___? (Hawkins, 1999, 35a)

(Hawkins, 1999, p. 264)

Following the logic above, I assume that FGCH would prefer sentence 8 to sentence 7, because sentence 8 has more preferred structures. It includes a hospitable infinitival and a fewer count of syntactic nodes.

The Matrix Relationship Theory (MRT) proposes that extraction cannot occur between two clauses that lack a matrix relationship. If a matrix relationship does not exist, extraction cannot occur. Extraction cannot occur in sentence 7 because the clauses lack a matrix relationship.

MRT differs from FGCH because it explains why the complex NP environment is a resistant structure. MRT proposes that a complex NP is 'complex' when it intervenes with a strict structural requirement: sisterhood. The complex NP is not 'complex' in sentence 8 because it does not intervene with the loose structural requirement: c-command.

While *Barriers* posits that the tensed island in sentence 7 changes the IP blocking category to a barrier, MRT simply accounts for the tensed island as a free feature of the closed clause.

MRT is similar to *Barriers*, but it tries to provide more transparency into the factors that create barriers. At the very least, I hope this paper introduces the idea that structural relationships, and the lack thereof, play a critical role in predicting the conditions necessary for filler extraction.

References

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