Effects of Local and Global Context on Processing Sentences with Subject and Object Relative Clauses

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Abstract An eye tracking study investigated the effects of local and global discourse context on the processing of subject and object relative clauses, whereby the contexts favored either a subject relative clause interpretation or an object relative clause interpretation. The fixation data replicated previous studies showing that object relative clause sentences were more difficult to process than subject relative sentences. Crucially, however, the reading difficulty asymmetry between subject and object relative clause sentences disappeared when the sentences were presented with a local or a global discourse context that favored the objects in the object relative clauses. These findings demonstrate that the evidence for a syntax-based account of sentence processing is found when sentences are presented in isolation. However, if sentences are placed more naturally, in context, discourse factors outweigh the initial structural assignment.

Keywords Syntactic parsing · Sentence processing · Eye tracking · Discourse comprehension · Garden Bath · Linguistic context

Introduction

Much of the research in psycholinguistics has focused on the role of syntactic parsing in the processing of sentences in isolation. To what extent pragmatic and lexical semantic context plays a role on syntactic parsing remains unclear (Altmann 1988; Altmann and Steedman 1988; Rayner et al. 1983; Taraban and McClelland 1998). The present study investigated the extent to which contextual factors exerted effects on sentence processing.
In the psycholinguistic literature two accounts of sentence processing can generally be distinguished depending on the extent to which they emphasize the role of discourse context in syntactic parsing, a syntax-based account and a discourse-based account (Mitchell and Corley 1992).

According to the syntax-based account, parsing commitments are initially made on the basis of purely syntactic considerations, without taking into account the semantic or pragmatic information (e.g., Frazier 1987; Rayner et al. 1983). The most representative model in this account is the garden path model proposed by Frazier and colleagues (Frazier 1978, 1987; Frazier and Rayner 1982; Rayner et al. 1983). According to the garden path model, there exist two largely independent processors that are operative during sentence comprehension: a syntactic processor that initially computes only the structurally preferred analysis of a sentence, and a thematic processor that examines the alternative thematic structures of a word (to compare the relative plausibility of each), selecting the semantically and pragmatically most plausible one. The model postulates that syntactic factors alone are responsible for determining the preliminary interpretation of the sentence structure.

According to the second account, the discourse-based account, parsing is guided from the outset by non-syntactic factors such as semantic and pragmatic information. The most representative model for the discourse based account is the referential support model proposed by Altmann (1988) and Crain and Steedman (1985). According to this model, the structural analysis is resolved by reference to discourse-based features. More specifically, it maintains that sentential structures are always settled in favor of the readings that are most compatible with the discourse features of materials preceding the sentence. The discourse decision is made on the basis of a principle of parsimony (Crain and Steedman 1985). This principle states that each reader has only one model of the universe of discourse. The reading that involves fewest alternations to the original one, while being consistent with the presuppositions or entailments, will be adopted as the most plausible one.

In essence, the crucial difference between the syntax-based models and the discourse-based models of parsing lies in whether parsing decisions are initially made on syntactic considerations alone or are guided by the discourse. To discriminate between the two types of accounts, numerous studies have been carried out to address this issue (Ferreria and Henderson 1990; Mitchell 1984; McClelland 1987; Taraban and McClelland 1998).

The present study differs from previous studies by defining contextual factors more broadly than the discourse-based account has done so far. More specifically, the current study focuses on the effect of local and global extra-sentential linguistic context on processing subject relative and object relative clauses. An example of each type of sentence is given in subject relative (SS) clause sentence (2a) and object relative (SO) clause sentence (2b):

2a. The child that chased the babysitter squealed with delight at the game. (SS)
2b. The child that the babysitter chased squealed with delight at the game. (SO)

In sentences such as (2a), the extracted element (e.g., the child) serves as the syntactic subject of the main clause (as in the sentence, the child squealed with delight), and also it is the subject of the relative clause (as in the sentence, the child chased the babysitter). When the extracted element is the subject in the relative clause, this kind of relative clause is referred to subject relative clause or SS structure (MacWhinney and Pleth 1988; Traxler et al. 2002).

In contrast, the extracted element (the child) in sentence (2b) serves as the syntactic subject of the main clause, and it is the direct object of the verb in the relative clause (as in the sentence, the babysitter chased the child). When the extracted element is the object in the relative clause, this kind of relative clause is referred to object relative clause or SO structure (MacWhinney and Pleth 1988; Traxler et al. 2002).