The role of default constructions in the processing of mismatch: the case of possessive free relatives

A growing body of psycholinguistic evidence suggests that sentences with canonical structures are understood more quickly and accurately than those with non-canonical structures (F. Ferreira 2003; Townsend and Bever 2001). Townsend and Bever (2001) argue that "canonical sentence templates" representing the most commonly used orderings of arguments within a clause (e.g., NP-V-NP = Agent-Action-Patient) are used early in sentence comprehension to derive a preliminary interpretation before a full parse is completed. Sentences that match these templates (e.g. active sentences, subject clefts) are processed faster and lead to fewer comprehension errors than those that do not (e.g. passive sentences, object clefts). Thus, canonical templates appear to play an important role in sentence processing.

Such evidence has important implications for linguistic theory because it suggests that certain canonical (or default) constructions are both represented as part of linguistic competence and used in sentence processing. Furthermore, default constructions may help constrain the occurrence of mismatch constructions in both competence and performance by making mismatches costly for language users. In this paper, we report on an experiment (the first in a series of experiments) which offers additional psycholinguistic evidence for the importance of default constructions in the processing of syntax-semantics mismatch and argue that these results strengthen the case for a parallel-architecture, constructionist approach to grammar.

While canonical templates have been argued to operate at the clause level, no previous studies have asked whether similar templates exist for the noun phrase. Our experiment draws on syntactic studies of headedness mismatch within the NP (Yuasa 2005; Wright and Kathol 2003) to test whether non-canonical ordering of the head noun affects sentence comprehension. Specifically, this experiment tests whether possessive free relatives as in (2) are more difficult to comprehend than ordinary possessive relative clauses as in (1) and non-possessive free relatives as in (4).

1. The guy whose dogs got loose is in trouble. (possessive non-free relative)
2. Whoever's dogs got loose is in trouble. (possessive free relative)
3. The dogs that got loose are in trouble. (non-possessive non-free relative)
4. Whichever dogs got loose are in trouble. (non-possessive free relative)
5. John's dogs that got loose are in trouble. (ordinary possessor + head)

We hypothesized that sentences of type (2) should be more difficult to interpret than the other types because they exhibit a non-canonical positioning of the head noun. In (2), the identify of the head must be understood from the possessor phrase *whoever's*, violating the canonical pattern whereby the noun *following* the possessor (as in 5) or determiner (as in 1, 3, 4) is the head and possibly leading readers/listeners to the false impression that, for example, *dogs* is the head of the subject NP in (2) and that it is the dogs that are in trouble rather than their owner.

To test this, we conducted a verb decision task measuring accuracy and response time for identifying the correct form of the main verb ("is" vs. "are") in written sentences where the verb is missing. For example, subjects would see a sentence such as in (6) on the computer screen and would press a button on a response box to indicate whether "is" or "are" is the correct verb to complete the sentence.

6. Whoever's dogs got loose __ in trouble.

A correct response requires that the head noun be identified correctly. We employed a fully crossed 2x2 design (free vs. non-free, possessive vs. non-possessive) using 100 sentences of types (1-4) (with number specification of the relevant nouns varied) and 100 fillers. Preliminary analysis of data from 42 subjects confirms our predictions: the most errors and the longest decision times were for sentences of type (2). Subjects were only 78% accurate for type (2), but 93% accurate for type (1). Although types (1) and (2) share the approximately the same level of semantic complexity[1], only type (2) has a non-

[1] The possessive free relative construction can be argued to be more complex semantically because it involves picking out a member of a set. For example, (2) can be paraphrased as: "Of the members of the

canonical ordering of the head noun. Similarly, mean RT for correct responses was 3998ms for sentences of type (2), but 3310ms for sentences of type (1) (see table 1).

Table 1: Accuracy and Response Time for Verb Decision Task

	possessive non-free	possessive free	non-possessive non-free	non-possessive free
percent correct	93	78	96	94
response time (ms)	3310	3998	2413	3160

A repeated measures ANOVA for the accuracy data showed significant main effects for both possessive ($F = 32.06$, $p<0.01$) and free ($F=54.13$, $p<0.01$), as well as a significant interaction between the two factors ($F=23.68$, $p<0.01$). The interaction effect is shown in the disproportionately lower accuracy of the possessive free relatives as compared with non-possessive free relatives as in (4) or regular possessive relative clauses as in (1). That is, the combination of relativizing on the possessor and using a free relative structure had a larger effect than either factor by itself. ANOVA results for response time were similar: there were main effects for both possessive ($F=101.01$; $p<0.01$) and free ($F=43.1$; $p<0.01$). However, there was no significant interaction between the two factors in this case.

In summary, subjects responded less accurately and more slowly to sentences containing possessive free relatives. Much like Ferreira's (2003) results for passive vs. active sentences and object vs. subject clefts, these results appear to support an account in which readers initially process noun phrases in terms of a default construction specifying the canonical position of the head noun as following the possessor or determiner. Although a more specific possessive free relative construction exists in the language,

relevant set, the person whose dogs got loose is in trouble." However, this semantic complexity is also in sentence type (4) and was found to have little effect on accuracy.

allowing readers/listeners to access the relevant information and override the default construction in the majority of cases, the complexities of this construction are not always processed in time to ensure a correct interpretation of the sentence.

These results are significant for theories of grammatical competence first of all because they support the existence of default constructions in grammatical representations. Although derivational theories of syntax could resort to movement operations and/or empty categories to account for these facts, or stipulate the existence of "canonical templates" outside the grammar itself, a constructionist approach offers a natural explanation for where these canonical templates come from—the default constructions of the language. Secondly, our results suggest that default constructions actually constrain the occurrence of certain kinds of mismatch—in this case, non-canonical positioning of the head noun with respect to its specifiers/modifiers—by making such constructions costly for language users. Therefore, such constructions are likely to be rare in languages, to require special discourse conditions for their usage, and/or to require special morphemes as cues to their non-canonical structure (in this case, the word *whoever's*). We will conclude that our experimental results lend additional support to recent proposals by Goldberg and Bencini (2005), Jackendoff (to appear), and Sag and Wasow (to appear) that a non-derivational, parallel-architecture style of grammatical theory is highly compatible with what is known about language processing.

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