1. Introduction

Grammatical illusions arise when an ungrammatical sentence sounds acceptable, at least at first blush. For instance, the ungrammatical sentence *The authors [that no critics recommended] have ever received acknowledgment* is judged more acceptable than the same sentence without *no*. Such effects have been argued [1, 2] to support models wherein items in need of licensing (e.g. the NPI *ever*) execute an error-prone search in memory for a licensor. If the incorrect constituent is retrieved during this search (e.g. *no critics*), its reactivation creates a spurious but fleeting perception of acceptability. Support for this model comes from [2], who provide evidence that the strength of grammatical illusions is modulated by standard memory variables such as recency. We provide evidence for a novel grammatical illusion in European French: we show that unlicensed de-Noun Phrases, which are licensed by certain quantifiers (Q), can be spuriously licensed by grammatically inaccessible Qs. Furthermore, only Qs that have certain syntactic properties trigger the grammatical illusion, specifically, only Qs that independently participate in Quantification At a Distance [3] were seen to create the grammatical illusion. Consistent with previous work on the nature of cues in memory retrieval, we argue that this is the result of specific abstract syntactic cues that guide the search of a licensing element. This paper brings further evidence that syntax is used to structure working memory.

2. Background

In (1), Q (*beaucoup or plein ‘many’*) sits next to its restrictor (as in English). The restrictor, marked with *de / d’* (de-NP) needs to be licensed by it (2). Some Qs can Quantify At a Distance (+QAD; e.g. *beaucoup ‘many’* in 3a); others cannot, and must be strictly local to the de-NP (-QAD; e.g. *plein ‘many’* in 3b). We do not commit as to whether (3a), in which Q appears preverbally, is derived (via overt movement of Q) from (1)[5, 6, 7, 8 a.o.] or not [3, 4, 11, 15, 16 a.o.].

(1) Francis a écrit beaucoup / plein de lettres.
Francis has written a lot of letters.
(2)*Francis a écrit de lettres.
(3)a. Francis a beaucoup écrit de lettres.
Francis has written many/much de letters
b. *Francis a plein écrit de lettres.

3. Illusory licensing

In E1/E2 we probed for the possibility of illusory licensing of unlicensed de-NPs and its source. We tested this by creating sentences like (4). First, those sentences let us establish if there is spurious licensing. INT+QAD has an unlicensed object de-NP, with a linearly preceding Q that licenses the goal de-NP. If there is spurious licensing of the object de-NP, this would be reflected in greater acceptability of the INT+QAD relative to the UNGRAM

(4)[GRAM+QAD] J’ai envoyé [à beaucoup de gens] [des invitations] pour mon anniversaire.
I’ve sent to many people some invitations for my birthday.

[UNGRAM] J’ai envoyé [goal à des gens] [object d’invitations] pour mon anniversaire.

baseline. Second, we tested whether the type of Q matters. We hypothesized that the possibility to establish a long-distance dependency (QAD) facilitates intrusive licensing of a grammatically unlicensed de-NP. INT-QAD is exactly like INT+QAD except that the Q licensing the goal de-NP is -QAD. If intrusive licensing arises because of the possibility to quantify at a distance, then we expect INT+QAD sentences to be judged acceptable significantly more often than UNGRAM
and INT-QAD sentences in which either no Q is present or Q is -QAD. If on the other hand, intrusive licensing is not conditioned by the type of Q used, then we expect both INT+QAD and INT-QAD sentences to be judged acceptable significantly more often than UNGRAM. In both E1 (n=40, RSVP + speeded acceptability) and E2 (n=50, RSVP + speeded acceptability), logistic mixed effects models confirmed that INT+QAD > UNGRAM was significant. In E3, we confirmed this pattern holds in offline judgments using Likert scale responses, and in E4, we confirmed that this pattern holds even when the intrusive Q is in subject position (5). In E1-E4 we consistently observed that only +QAD Qs create illusory licensing.

(5) [INT+QAD] Beaucoup de gens ont envoyé [d’ inviations] pour mon anniversaire. 

Because de-NP illusions are restricted to those Qs that can independently move, and because this asymmetry in their movement possibility has been proposed to originate from their structure, we suggest that this effect is the result of a memory-retrieval process which wants to match a cue that is indexed on the structure of +QAD quantifiers. We now turn to giving background on proposed structure of +QAD Qs.

4. Structure of QPs in French

We saw that beaucoup-type Qs can quantify at a distance (3a) whereas plein-type Qs cannot (3b). These two types of quantifiers are differentiated syntactically in two other ways: (i) beaucoup-type Qs can be used as VP adverbs whereas plein-type Qs cannot (6a) [12], (ii) beaucoup-type Qs can be used as object proforms whereas plein-type Qs cannot (6b; [8]). These differences are not apparent in the (simple) cases where Q and de-NP are immediately adjacent (1), but instead refer to the behavior of these Qs in other contexts.

(6a) [8] J’ai beaucoup/*plein dormi. ‘I’ve slept a lot.’

(6b) J’ai beaucoup/*plein fait pour les pauvres. ‘I’ve done a lot for the poor.’

Following [9, 10], we assume that beaucoup-type quantifiers in (1) have the underlying structure in (7): the phrase beaucoup de lettres contains an adverb beaucoup, a silent adjective, and a silent noun. We show in our paper that this explains the three generalizations we gave above.

(7) Francis a écrit beaucoup de lettres. MANY NUMBER

5. A cue-based analysis

We couch our account in the cue-based parsing model of [13] implemented in the ACT-R cognitive architecture ([14] a.o.). We propose that de-NPs licensed by a string-adjacent quantifier does not trigger retrieval as in that case both quantifier and de-NP are in the focus of attention. However, when they are not adjacent, the de-NP is in the focus of attention triggers retrieval: it triggers a search in memory for a matching cue. We claim that because +QAD Qs have a complex layered structure, beaucoup is stored in memory with cues that index this underlying structure, e.g. [NP+AdjP+AdvP] following [9, 10].

6. Conclusion

The distribution of de-NP illusions in French demonstrates that illusory licensing phenomena are not triggered merely by the presence of lexical de-NP licensors in linearly preceding material. Instead, in the case of de-NP illusions, additional structural conditions must hold in order to observe spurious de-NP licensing: the Qs must be, in principle, able to participate in QAD dependencies. On our analysis, this arises because the parser recruits specific syntactic cues that selectively reactivate phrases of a specific syntactic type during the course of licensing QAD dependencies consistently with [12].