NPI Illusions are a problem of quantification
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Much recent work has investigated the extent to which negative polarity items (NPIs) are suscep- tible to illusions of grammaticality [1–4]. NPIs are lexical items (e.g. "ever", "any") which are only grammatically licensed when c-commanded by a negative element [5], as seen in the contrast between (1a) and (1b). However, studies frequently find that comprehenders fail to notice the ungrammaticality of sentences like (1c), where a negative element ("no") does not c-command the NPI ("ever"). This grammaticality illusion has led some researchers [2, 4, i.a.] to suggest that NPIs engage a cue-based retrieval mechanism [6, i.a.] to identify their licensors: In (1c), the non-commanding negative quantifier "no" may be accidentally re-accessed because it partially matches the retrieval cues engaged by "ever", thereby spuriously licensing the NPI and giving rise to the illusion of grammaticality.

(1)   a. **No hunter** who the fisherman believed to be trustworthy will *ever* shoot a bear.
      b. ∗ **The hunter** who the fisherman believed to be trustworthy will *ever* shoot a bear.
      c. ? The hunter who **no fisherman** believed to be trustworthy will *ever* shoot a bear.

Recent work has shown that NPI illusions are surprisingly fragile: Not all NPIs are illusorily licensed [3] and some licensors may not always spuriously license NPIs [4,7]. Against this background, the present study aims to show that only quantificational negation (e.g., [no fisherman]$_{NP}$) produces NPI illusions.

Three speeded acceptability judgement studies were conducted to examine the ability of various negative elements embedded in relative clauses to spuriously license NPIs, as shown in (2). We tested sentences containing "didn't" (expt1), "did not" (expt2), and "never" (expt3) replicating and extending the result of [7]. These were compared to a grammatical baseline with a c-commanding negative element, as in (1a), an ungrammatical baseline with no negative element, as in (1b), and the attested illusion structure in (1c). If the presence of a negative feature is all that is necessary to spuriously license an NPI, we would expect these other licensors to behave similarly to the negative quantifier in (1c).

(2)   The hunter who the fisherman $\left\{ \begin{array}{l} \textbf{didn't believe} \\ \textbf{did not believe} \\ \textbf{never believed} \end{array} \right\}$ to be trustworthy will *ever* shoot a bear.

Panels 1-3 of Figure 1 show that, unlike relative clauses with a negatively quantified subject, relative clauses containing the negative licensors "didn't", "did not", and "never" did not result in illusions of grammaticality: Participants judged the relative-subject-no condition to be acceptable more often than the ungrammatical baseline, but this difference was not observed for "didn't", "did not", or "never". In a followup experiment, we also investigated the influence of NPI licensing verbs like as "doubt" which putatively lack a negative feature and found no evidence of an illusion (expt4).

One readily apparent difference between the attested illusion and the other negative licensors tested was their relative structural height. In our studies, "no" was located in subject position, which was higher in the relative clause structure than the other negative elements. To examine whether these effects were attributable to depth of embedding, we conducted a fourth experiment testing the quantifier "no" in the object position of the relative clause, as in (3), again using the same three baselines in (1) (expt5). In a final experiment, we investigated the decomposed negative quantifier "not a single" in both subject, and object position (expt6).

(3)   The hunter who believed $\left\{ \begin{array}{c} \textbf{no} \\ \textbf{not a single} \end{array} \right\}$ fisherman to be trustworthy will *ever* shoot a bear.

As shown in panels 5 and 6 of Figure 1, we observed a grammaticality illusion for negative quantifiers in both the relative clause subject, and relative clause object position, and statistical modeling showed no evidence of a difference between these conditions ($\hat{\beta}$=-0.04, p=0.47). Taken together with the results of Experiments 1-3, these results suggest that quantification plays a unique role in creating NPI illusions.

In summary, we show that NPI illusions are relegated to highly circumscribed situations which are not easily explained in a system which simply attempts to retrieve a negative element. Instead, we suggest that these effects are related to the special status of negative quantifiers and may be related to the difficulty of representing scope in real-time processing.

Figure 1: *Mean by-subject proportion grammatical responses in Experiments 1-6. Error bars represent standard error.*
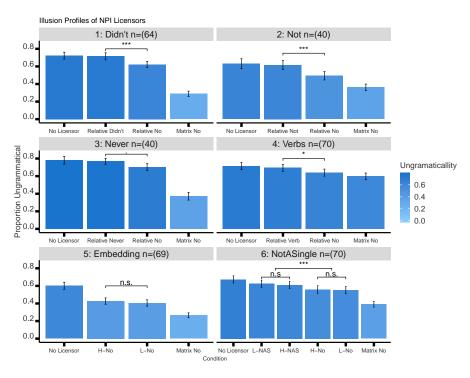

Illusion Profiles of NPI Licensors

Table 1: *Fixed effect $\hat{\beta}$ and p-values for logistic regression models fit to proportion "ungrammatical" responses in each experiment 1-5. Each model helmert coded "conditon" as a fixed effect (Grammaticality: grammatical=1, ungrammatical/illusionA/illusionB=-0.33; Illusion: grammatical=0, ungrammatical=1, illusionA/illusionB=-0.5; Licensor: grammatical/ungrammatical=0, illusionA=1, illusionB=-1), and random slopes/intercepts by subject and item.*

Fixed Effects	Expt 1		Expt 2		Expt 3		Expt 4		Expt 5	
	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p
Grammaticality	1.78	<.001	0.95	<.001	1.64	0.44	<.001	<.001	0.98	<.001
Illusion	0.23	<.05	0.32	<.05	0.23	0.12	0.21	<.05	0.70	<.001
Licensor	0.30	<.001	0.36	<.001	0.21	<.06	0.19	<.05	-0.05	0.47

References

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