

Identification of universal quantifier restriction and illusory NPI licensing

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Negative Polarity Items (NPIs) like *ever* must be licensed by downwards entailing operators (negation, *only*, etc) in structurally accessible configurations. Nevertheless, psycholinguistic research has found that the presence of potential licensors in structurally inaccessible locations can drive illusions of a licensed NPI (Parker & Phillips, 2016; Vasishth et al., 2008). There are currently two competing hypotheses for the source of these illusions. One hypothesis is that illusions are a result of incorrect retrieval of structurally inaccessible licensors due to noisy cue-based memory retrieval. A second hypothesis considers that these illusions may reflect the application of semantic/pragmatic processes (Xiang, Dillon, & Phillips, 2009; Xiang, Grove, Giannakidou, 2013).

Universal quantifiers like *every* offer an interesting but unexplored testbed for both of these hypotheses. *Every* can license NPIs within its restrictor clause (1a), which is a downward entailing environment (Ladusaw, 1980), but not within its scope which is not downward entailing (1b). NPI licensing with a universal quantifier requires the parser to identify the extent of the restrictor and determine the structural position of the NPI, a process that, due to the delicacy of real-time NPI licensing, may be prone to errors. We investigated whether illusory licensing of NPIs occurs in the scope of a universal quantifier.

Predictions. We predicted that **(P1)** if illusory NPI licensing is driven by faulty memory retrieval exclusively, these illusions should persist independently of manipulations to the restrictor clause. However, **(P2)** if these illusions are the result of difficulty in identifying the boundaries of the quantifier's restrictor, we predicted that the addition of modifiers to the quantified subject would allow the parser to identify the extent of the restriction clause by providing a suitable contrast set before parsing the NPI, thus reducing the illusory effect.

Prior: Speeded judgments. In prior research (Hildebrandt & Husband, 2019), four speeded acceptability judgments (summarized in Table 1) found A) illusory licensing of *ever* outside the restriction of *every* (2,3) that was B) not found with the existential quantifier *some* (2,4), suggesting that illusions are specific to universal quantifiers, not quantifiers in general. This illusory licensing effect was diminished when either C) a pre-nominal modifier (2,3,5a) or D) a post-nominal modifier (2,3,5b) was introduced into the quantifier's restrictor. These results are consistent with **(P2)**. Adding a modifier aided identification of the quantifier's restrictor, allowing the parser to more easily reject the unlicensed NPI, thus reducing the illusory effect.

Current: Self-paced reading. To observe the online effect of illusory licensing, we conducted two self-paced reading studies using the items from speeded judgements. **Study 1** (N=72, Item=40) compared the sentences in (2,3,4) [4 conditions]. Reading times for the Definite ($t=2.394$, $p=.017$) and Existential ($t=2.126$, $p=.034$) condition were significantly slower than Negation on the first Spill-over word. The Universal was not ($t=0.464$, $p=.642$), a result consistent with the illusory licensing effect found in speeded judgments (A, B).

Study 2 (N=72, Item=50) compared the sentences in (2,3,5) [5 conditions]. Reading times for the Definite ($t=2.436$, $p<.01$) were significantly slower than Negation on the first Spill-over word. The Universal and Universal+Pre-/Post-modification conditions were not (Uni: $t=0.927$, $p=.0.354$; Uni+Pre: $t=1.111$, $p=.267$; Uni+Post: $t=0.181$, $p=.856$). Illusory licensing persisted with both modification conditions, a distinct effect from speeded judgments (C, D).

Conclusions. While speeded judgement results suggest that modification aids identification the universal quantifier's restriction **(P2)**, self-paced reading times continued to show illusory licensing effects even in the presence of modifiers. This suggests that the parser requires time online to identify a quantifier's restriction and close it off to further processing. This slow identification process can snag stray NPIs, leading them to appear to be licensed temporarily online. Further research is planned to investigate the fine-grained timing of this temporary illusory licensing effect.

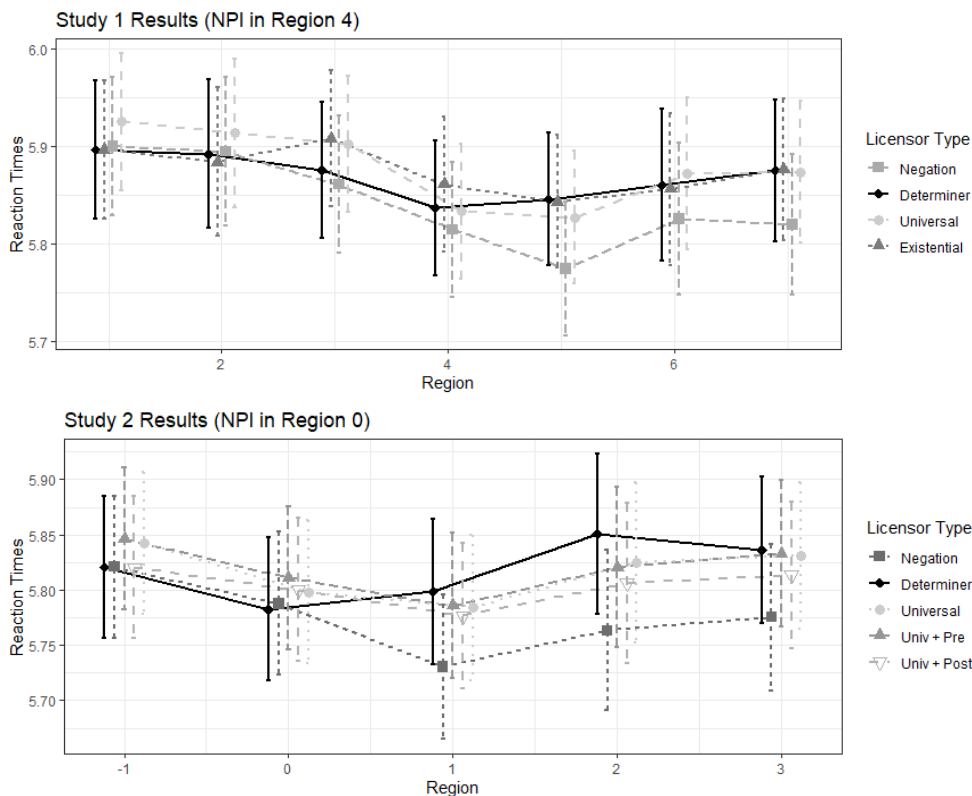
- (1) a. Every [_{RESTRICTOR} student [who has ever come to class]] [_{SCOPE} has received a good mark].
 b. Every [_{RESTRICTOR} student [who has come to class]] [_{SCOPE} has *ever received a good mark].

Example Stimuli

- (2) **No/The** journalist has ever been recognized for his online contributions. (Neg / Def)
 (3) **Every** journalist has ever been recognized for his online contributions. (Universal)
 (4) **Some** journalist has ever been recognized for his online contributions. (Existential)
 (5) a. **Every newspaper** journalist has ever been recognized for his online contributions. (Uni+pre-mod)
 b. **Every** journalist who was published on the website has ever been recognized for his online contributions. (Uni+post-mod)

Table 1: Summary of speeded judgement study results (significant effects in bold)

		<i>NPI_Q – NPI_The</i>	<i>z</i>	<i>p</i>
Study A	Every	7.66%	2.229	.026
Study B	Some	-0.65%	-0.161	.872
Study C	Every + pre-mod	4.92%	1.231	.218
Study D	Every + post-mod	5.94%	1.394	.163



Selected References. Hildebrandt, L., & Husband, E. M. (2019). Quantifiers, Restrictors, and Illusory NPI Licensing. Poster given at the 32nd CUNY Conference on Human Sentence Processing. Boulder, CO. Ladusaw, W. A. (1979). *Negative polarity items as inherent scope relations*. Ph.D. Dissertation, University of Texas at Austin. Parker, D., & Phillips, C. (2016). Negative polarity illusions and the format of hierarchical encodings in memory. *Cognition*, 157:321-339. Vasishth, S., Brüßow, S., Lewis, R. L., & Drenhaus, H. (2008). Processing Polarity: how the ungrammatical intrudes on the grammatical. *Cognitive Science*, 32, 685-712. Xiang, L., Dillon, B., & Phillips, C. (2009). Illusory licensing effects across dependency types: ERP evidence. *Brain and Language*, 108, 40-55. Xiang, M., Grove, J., & Giannakidou, A. (2013). Dependency dependent interference: NPI interference, agreement attraction, and global pragmatic inferences. *Frontiers in Psychology*.