

# Examining the short-before-long preference in non-canonical constituent order

A corpus-based study on English locative inversion

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# Introduction: Locative inversion in English

Constructions in English manifest considerable variability in constituent order.

- (1) a. (Locative inversion)  
[<sub>PP</sub> Above him ] slid [<sub>NP</sub> the evasive shadow of a storm cloud ].  
b. (Canonical order)  
[<sub>NP</sub> The evasive shadow of a storm cloud ] slid [<sub>PP</sub> above him ]

In English locative inversion,

- the locative PP (preposition phrase) is placed in a preverbal position, while
- the NP (noun phrase) is postposed after the verb.

# Introduction: Locative inversion in English

- (2) a. (Locative inversion)  
       [<sub>PP</sub> Above him ] slid [<sub>NP</sub> the evasive shadow of a storm cloud ].  
       b. (Canonical order)  
       [<sub>NP</sub> The evasive shadow of a storm cloud ] slid [<sub>PP</sub> above him ]

Two features of English locative inversion:

- **“Mismatches of role, function and category”**: NP plays the role of subject with respect to agreement in a postverbal position. (Bresnan, 1994, p. 74)
- **Restricted choice of verbs**: The verb in locative inversion typically belongs to the copula *be*, unaccusatives, passives and unergatives.<sup>1</sup> (Birner, 1994; Culicover & Levine, 2001; Levin & Hovav, 1995)

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<sup>1</sup>If the NP subject acted as the agent, the intransitive verb would be defined as “unergative” and “unaccusative” otherwise.



# Introduction: Possible factors of ordering choice

## Question

Why such a non-canonical ordering construction was chosen in language usage?

We focused on three possible factors here:

- **Short-before-long preference**<sup>2</sup>: Long (or more complex) constituents tend to occur later or in a less prominent position (Bresnan et al., 2007; MacDonald, 2013).
- **Given-before-new preference**: The given (or relatively familiar) information is expected to be presented by the preverbal PP (Birner, 1994; Webelhuth, 2011).
- **Verb class**: Heavy inversion may occur with less frequent verb classes, such as unaccusatives and unergatives (Culicover & Levine, 2001; Holler & Hartmann, 2012).

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<sup>2</sup>Such preference was also referred to as “end-weight” (Wasow, 1997a), “early immediate constituents” (Hawkins, 2004) and “easy first” (MacDonald, 2013). We adopted the terminology as “the short-before-long preference” here.

# Introduction: The current study

Locative inversion, as a typically non-canonical ordering construction, **may require more efforts in processing than its canonical order alternation** (Tran, 2021; Yano & Koizumi, 2018).

Previous studies (Bresnan et al., 2007; Grafmiller & Szmrecsanyi, 2018; Heller et al., 2017; Rajkumar et al., 2016) typically examined ordering choices in canonical ordering sentences.

- Therein, the ordering choice is independent of the subject placement and only concerns a phrase within a sentence.

We attempted to investigate

- whether the two ordering preferences **can alleviate the processing difficulty** in a non-canonical ordering construction, and
- the extent to which non-canonical constituent order manifest variability in the interplay **among grammatical, discourse and lexical constraints**.

# Introduction: The current study

We attempted to investigate

- whether the two ordering preferences **can alleviate the processing difficulty** in a non-canonical ordering construction, and
- the extent to which non-canonical constituent order manifest variability in the interplay **among grammatical, discourse and lexical constraints**.

## Research Questions

- ① Can these two preferences reduce the processing difficulty of English locative inversion compared to its canonical ordering alternation? Do the effects of these two preferences diverge by verb class?
- ② Is there any interaction effect between different variables in the ordering choice of locative inversion? If yes, how do we interpret the interaction effect?

# Data: Brown and BNC

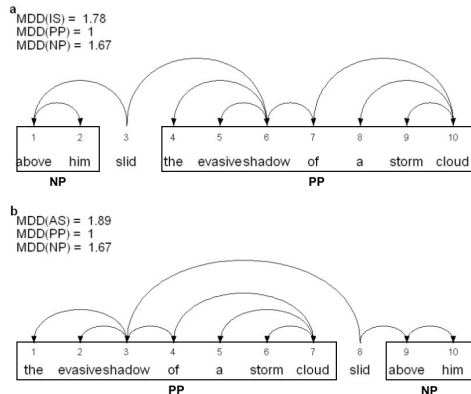
Our selection of data aimed to represent the reliable language usage (the bulk of data).

- Source: BNC and Brown
- Procedure: RegEx -> Manual select -> Filter -> Resample
- Filter: Length  $\leq 50$  and Freq. of prep  $\geq 3$
- Resample: (Bootstrap for UNA and Oth)

	BE	UNA	Oth	Total
BNC	405	72 (59)	62 (37)	539 (501)
Brown	49	28 (22)	38 (19)	115 (90)
Total	454	100 (81)	100 (46)	654 (591)

Note. “BE” for copula be, “UNA” for unaccusative, and “Oth” contains both the unergative and the passive classes; the original sample sizes were presented in the brackets for resampled groups.

# Methods: Variables



## Research question

Can these two preferences  
reduce the processing difficulty of English  
locative inversion compared to its canonical  
ordering alternation?

We used MDD (mean dependency distance) to measure the processing difficulty (Futrell et al., 2015; Gibson, 2000; Liu, 2008).

**SHORTEN:** MDD of IS is shorter than that of AS, containing two levels:

- True:  $MDD\ of\ IS < MDD\ of\ AS$
- False:  $MDD\ of\ IS \geq MDD\ of\ AS$



# Methods: Variables

Variable	Type	Description
SHORTEN	Logical	Whether MDD of IS is shorter than that of AS, containing two levels: <ul style="list-style-type: none"> <li>- True: MDD of IS &lt; MDD of AS</li> <li>- False: MDD of IS <math>\geq</math> MDD of AS</li> </ul>
LEN	Numeric	Sentence length of IS (by word)
RWLEN	Numeric	Ratio of NP's length and PP's length ( $\frac{\text{NP length}}{\text{PP length}}$ )
RWMDD	Numeric	Ratio of NP's MDD and PP's MDD ( $\frac{\text{NP MDD}}{\text{PP MDD}}$ )
CGIV	Categorical	Category of givenness combination, containing three levels: <ul style="list-style-type: none"> <li>- Equ: Equal, including new PP – new NP and inferable PP – inferable NP</li> <li>- GbN: Given before new, namely given PP – new NP</li> <li>- IbN: Inferable before new, namely inferable PP – new NP</li> </ul>
CVP	Categorical	Category of predicate verb, containing three levels: <ul style="list-style-type: none"> <li>- BE: copula be</li> <li>- UNA: unaccusative verb</li> <li>- Oth: unergative or passive verb</li> </ul>



# Outline

- Can these two preferences reduce the processing difficulty of English locative inversion compared to its canonical ordering alternation? Do the effects of these two preferences diverge by verb class?

-> Logistic regression: Main effects (75% training and 25% testing)

- Is there any interaction effect between different variables in the ordering choice of locative inversion? If yes, how do we interpret the interaction effect?

-> Logistic regression: Interaction effect(s) (75% training and 25% testing)

# Results: Main effects

$$\text{SHORTEN} \sim \text{LEN} + \text{RWLEN} + \text{RWMD} + \text{CGIV} + \text{CVP} \quad (1)$$

	GVIF ( <i>df</i> )	Estimate (SE)	OR (95% CI)	<i>Z</i>	<i>p</i>
LEN	1.36 (1)	0.28 (0.14)	1.32 [1.00, 1.74]	1.95	.051
<b>RWLEN</b>	1.4 (1)	0.61 (0.15)	1.85 [1.37, 2.52]	3.99	<.001
CGIV: Equ	1.08 (3)	-0.04 (0.27)	0.96 [0.56, 1.62]	-0.16	
<b>CGIV: GbN</b>		0.43 (0.16)	1.54 [1.12, 2.13]	2.65	.008
CGIV: IbN		0.12 (0.17)	1.13 [0.82, 1.56]	0.72	
<b>CVP: UNA</b>	1.13 (2)	-0.83 (0.31)	0.44 [0.24, 0.79]	-2.7	.007
<b>CVP: Oth</b>		-0.48 (0.29)	0.62 [0.35, 1.09]	-1.67	.096

Prediction accuracy: 68.90% (significantly higher than a chance accuracy of 55.48%,  
 $p_{\text{binominal}} < .001$ .)

# Discussion: Main effects

- ① The short-before-long and given-before-new preferences **can both effectively lessen the processing difficulty** brought by the non-canonical order of locative inversion.
  - ② Constituent length (RWLEN) **better reflects the grammatical weight** (Arnold et al., 2000; Stallings & MacDonald, 2011; Wasow, 1997b) than constituent complexity (RWMDD) in the current case.
  - ③ The use of **some verb class (UNA and Oth) may cause extra processing difficulty** in English locative inversion.
    - Discourse function (Nakajima, 2001): UNA is to present an existing state of event (requiring more description?).
- (3) (unaccusative, BNC)
- At the railway stations appeared cards, cigars, beer, wine, brandy (the sale of which on their own soil the Bokhariots have prohibited by agreement).
- Frequency effect (Diessel, 2007): UNA and Oth are less frequently used and thus predictable, causing more difficulty in processing.

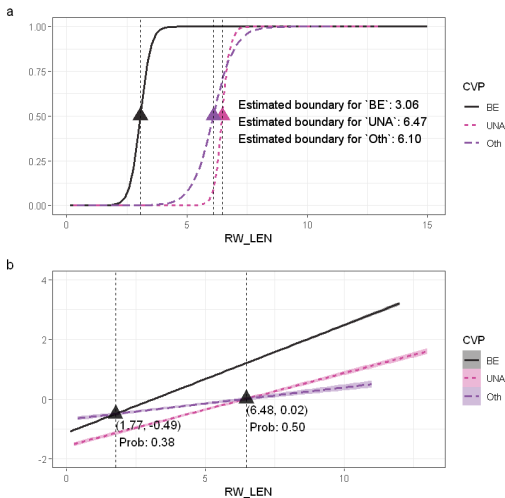
# Results: Interaction effect

$$\text{SHORTEN} \sim \text{RWLEN} + \text{CGIV} + \text{CVP} + \text{RWLEN} \times \text{CVP} + \cancel{\text{RWLEN} \times \text{CGIV}} + \cancel{\text{CGIV} \times \text{CVP}} \quad (2)$$

	GVI $F$ ( $df$ )	Estimate ( $SE$ )	OR (95% CI)	$Z$	$p$
<b>RWLEN</b>	1.45 (1)	1.03 (0.16)	2.78	6.4	<.001
CGIV: Equ	1.09 (3)	0.06 (0.27)	1.06	0.23	
<b>CGIV: GbN</b>		0.48 (0.17)	1.62	2.88	.004
CGIV: IbN		0.20 (0.17)	1.23	1.22	
<b>CVP: UNA</b>	1.15 (2)	-0.88 (0.30)	0.41	0.003	.004
<b>CVP: Oth</b>		-0.62 (0.27)	0.54	0.02	.025
RWLEN $\times$ CVP:UNA	1.22 (2)	-0.34 (0.27)	0.71	0.2	
			[0.42, 1.21]		
<b>RWLEN<math>\times</math>CVP:Oth</b>		-0.72 (0.33)	0.49	0.03	.026
			[0.26, 0.93]		

Prediction accuracy: 67.07% (significantly higher than a chance accuracy of 55.48%,  $p < .001$ )

# Discussion: Interaction effect



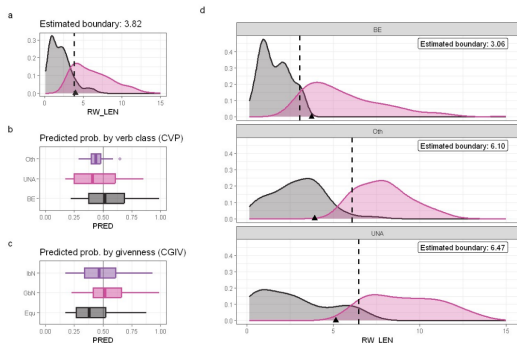
The second model reveals a similar pattern of effects with the first model, suggesting the reliability of the used variables.

Post-hoc analysis (logit-transform) reveals how CVP interacts with RWLEN in the alleviation of processing difficulty.

- As RWLEN increases, locative inversion becomes more efficient in processing compared to its canonical ordering alternation. (short-before-long)
- Heavy inversion (Culicover & Levine, 2001) tends to cooccur with unaccusatives, unergatives and passives (less frequently used verb class).

# Discussion: Interaction effect

We estimated the decision boundary <sup>a</sup> according to the interaction effect.



- **CVP** -> **RWLEN**: English locative inversion with less frequently used verb class tends to use longer NP, causing greater RWLEN ( $\Delta$  for the grouped mean).
- **RWLEN** -> **CVP**: When using less frequently used verb classes, English locative inversion may "requires" a greater RWLEN threshold to reduce the processing difficulty.

<sup>a</sup>Decision boundary for a focused variable is estimated by its value at which the predicted outcome equals 0.5 while other variables are held as 0.

# Conclusion

## General conclusion

The processing difficulty of non-canonical constituent order can be alleviated from both grammatical and discourse perspectives, and that the alleviation is achieved in the interaction among different variables.

- English locative inversion, as a non-canonical ordering choice, still aligns with two ordering preferences.
- Both the two ordering preferences and verb class affect the ordering choice and help reduce the processing difficulty in English locative inversion.
- Alleviating processing difficulty in inversion also involves interactions among grammatical, discoursal and lexical factors.





# Thanks for listening!

# References I

- Arnold, J. E., Losongco, A., Wasow, T., & Ginstrom, R. (2000). Heaviness vs. newness: The effects of structural complexity and discourse status on constituent ordering. *Language*, 76(1), 28–55. doi: 10.1353/lan.2000.0045
- Birner, B. (1994, June). Information status and word-order - an analysis of English inversion. *Language*, 70(2), 233–259. doi: 10.2307/415828
- Bresnan, J. (1994, March). Locative inversion and the architecture of universal grammar. *Language*, 70(1), 72–131. doi: 10.2307/416741
- Bresnan, J., Cueni, A., Nikitina, T., & Baayen, H. (2007, January). Predicting the dative alternation. In *Cognitive Foundations of Interpretation* (pp. 69–94).
- Culicover, P. W., & Levine, R. D. (2001, May). Stylistic inversion in English: A reconsideration. *Natural Language & Linguistic Theory*, 19(2), 283–310. doi: 10.1023/A:1010646417840
- Diessel, H. (2007, August). Frequency effects in language acquisition, language use, and diachronic change. *New Ideas in Psychology*, 25(2), 108–127. doi: 10.1016/j.newideapsych.2007.02.002



## References II

- Futrell, R., Mahowald, K., & Gibson, E. (2015, August). Large-scale evidence of dependency length minimization in 37 languages. *Proceedings of the National Academy of Sciences*, 112(33), 10336–10341. doi: 10.1073/pnas.1502134112
- Gibson, E. (2000). The dependency locality theory: A distance-based theory of linguistic complexity. In *Image, language, brain: Papers from the first mind articulation project symposium* (pp. 94–126). Cambridge, MA, US: The MIT Press.
- Grafmiller, J., & Szmrecsanyi, B. (2018, October). Mapping out particle placement in Englishes around the world: A study in comparative sociolinguistic analysis. *Language Variation and Change*, 30(3), 385–412. doi: 10.1017/S0954394518000170
- Hawkins, J. A. (2004). *Efficiency and Complexity in Grammars*. Oxford: Oxford University Press.
- Heller, B., Szmrecsanyi, B., & Grafmiller, J. (2017, March). Stability and Fluidity in Syntactic Variation World-Wide: The Genitive Alternation Across Varieties of English. *Journal of English Linguistics*, 45(1), 3–27. doi: 10.1177/0075424216685405

# References III

- Holler, S., & Hartmann, J. M. (2012, September). Locative Inversion in English: Implications of a Rating Study. In B. Stalterfoht & S. Featherston (Eds.), *Empirical Approaches to Linguistic Theory* (pp. 241–264). De Gruyter Mouton. doi: 10.1515/9781614510888.241
- Levin, B., & Hovav, M. R. (1995). *Unaccusativity: At the syntax-lexical semantics interface* (No. 26). Cambridge, Mass: MIT Press.
- Liu, H. (2008, May). The complexity of Chinese syntactic dependency networks. *Physica A: Statistical Mechanics and its Applications*, 387(12), 3048–3058. doi: 10.1016/j.physa.2008.01.069
- MacDonald, M. C. (2013). How language production shapes language form and comprehension. *Frontiers in Psychology*, 4. doi: 10.3389/fpsyg.2013.00226
- Nakajima, H. (2001). Verbs in locative constructions and the generative lexicon. *Linguistic Review*, 18(1), 43–67. doi: 10.1515/tlir.18.1.43
- Rajkumar, R., van Schijndel, M., White, M., & Schuler, W. (2016, October). Investigating locality effects and surprisal in written English syntactic choice phenomena. *Cognition*, 155, 204–232. doi: 10.1016/j.cognition.2016.06.008



## References IV

- Stallings, L., & MacDonald, M. (2011). It's not just the "heavy NP": Relative phrase length modulates the production of heavy-NP shift. *Journal of Psycholinguistic Research*. doi: 10.1007/s10936-010-9163-x
- Tran, T. (2021, January). Non-canonical word order and temporal reference in Vietnamese. *Linguistics*, 59(1), 1–34. doi: 10.1515/ling-2020-0256
- Wasow, T. (1997a, May). End-weight from the speaker's perspective. *Journal of Psycholinguistic Research*, 26(3), 347–361. doi: 10.1023/A:1025080709112
- Wasow, T. (1997b, March). Remarks on grammatical weight. *Language Variation and Change*, 9(1), 81–105. doi: 10.1017/S0954394500001800
- Webelhuth, G. (2011). Motivating non-canonicity in construction grammar: The case of locative inversion. *Cognitive Linguistics*, 22(1), 81–105. doi: 10.1515/COGL.2011.004
- Yano, M., & Koizumi, M. (2018, November). Processing of non-canonical word orders in (in)felicitous contexts: Evidence from event-related brain potentials. *Language, Cognition and Neuroscience*, 33(10), 1340–1354. doi: 10.1080/23273798.2018.1489066