# On the Event-Extraction Correlation: Evidence from Coordinate Structures

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## The Event-Extraction Correlation

**Coordinate Structure Constraint.** Ross's (1967) **Coordinate Structure Constraint** states "In a coordinate structure, no conjunct may be moved, nor may any element contained in a conjunct be moved, out of that conjunct." Yet, extraction *is* licensed when the first conjunct contains a "light" verb (*come, go, run, etc.*), as in pseudo-coordinations. Truswell (2006) observed that extraction was permitted out of *adjunct islands* (* *What did you get upset [because Mary said t ]?*) when the adjunct and the main clause describe a *single event* (*What are you working so hard [in order to achieve t ]?*)

**Two approaches to capturing the generalization.**

(1) I. **Direct Approach:** Encode the single event requirement directly into a constraint on wh-movement:

> **The Event Structure Presupposition Hypothesis: Locality domains for *wh*-movement are partially defined in event-structural terms**
> "*Wh*-questions carry a presupposition that the minimal constituent containing the head and the foot of the chain describes a single *event grouping*. *Wh*-movement is permitted only if the denotation of that minimal constituent can be construed accordingly." (Truswell, 2006)

II. **Indirect Approach:** Derive the correlation as an indirect consequence of two distinct constraints (informal versions stated below):

> i. *Syntax-Semantics Correspondence:* Only one event description per clause.
> ii. *Syntactic Locality Constraint:* Extraction is clause bounded; members of a chain must be successively bound in successive cyclic fashion.

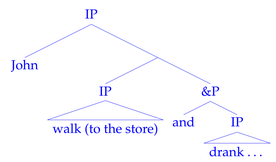
Two studies provide some initial support for the indirect approach over the direct one.

## Coordination

### Ordinary Coordination: 2 Lexical Vs.

(2) **Extraction illicit**
- a. John walked and drank a cold beer.
- b. ?? What did John walk and drink __?

(3) **Two event adverbs licensed**
- a. John *simultaneously* walked and drank a cold beer



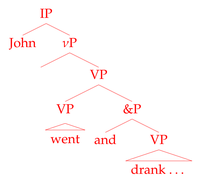

High (IP) Coordination: 2 events ⇒ 2 clauses

Indirect: The two constraints cannot be simultaneously satisfied, if there are two clauses/events.
Direct: The conjuncts may in principle be construed as a single event, licensing extraction.

### Pseudo-Coordination: Light + Lexical V.

(4) **Extraction licensed**
- a. John went and drank a cold beer.
- b. What did John go and drink __?

(5) **Two event adverbs prohibited**
- a. * John *simultaneously* went and drank a cold beer.




Low (VP) Coordination: 1 event ⇒ 1 clause

Indirect: Low coordination is possible just when its conjuncts describe a single event; monoclausal structure automatically satisfies the Locality constraint.
Direct: Extraction permitted by virtue of the fact that the two conjuncts are intended to describe a single event: if there were context suggesting that they were two events, extraction would not be licensed.

### Ambiguous Coordination.

(6) **Extraction licensed**
- a. John went to the store and drank a beer
- b. What did John go to the store and drink __?

(7) **Two event adverb licensed**
- a. John *simultaneously* went to the store and drank a beer

(8) **But no extraction if adverb present**
- a. * What did John simultaneously go to the store and drink __ ?

**Punchline.** *The Syn-Sem constraint (i) dictates the placement of the coordination: Low coordination allowed only if conjuncts describe a single event, and the structure is monoclausal. If conjuncts are situated Low in structure, then the Locality constraint (ii) is satisfied.*

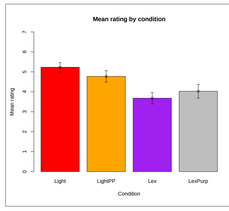
## Questionnaire study

**Predictions.** If the Event-Extraction Correlation holds, then single event structures (unambiguous pseudo-coordination =Light; ambiguous pseudo-coordination =LightPP) should be rated higher than two event counterparts (Lex).

**Materials & Method.** 20 participants in an offline questionnaire rated the acceptability of the materials (24 quartets as in 9) on a 7 point scale (7 = highest).

(9)
- A. What did the electrician go and repair after his afternoon coffee? — Light
- B. What did the electrician go in the attic and repair after his afternoon coffee? — LightPP
- C. What did the electrician crawl in the attic and repair after his afternoon coffee? — LexPP
- D. What did the electrician crawl in the attic to repair after his afternoon coffee? — LexPurp

**Results.** Pseudo-coordination conditions were indeed rated higher than two event counterparts, as well as extraction from Purpose clauses.




| Condition | Mean Rating |
|---|---|
| Light | 5.23 (1.05) |
| LightPP | 4.77 (1.30) |
| LexPP | 3.68 (1.29) |
| LexPurp | 4.03 (1.50) |

Subject and Items ANOVA:
$F_1(3, 19) = 18.27, p < 0.001$
$F_2(3, 19) = 13.49, p < 0.001.$

Pairwise comparisons:
Light, LightPP> LexPP, LexPurp, $p < 0.01$

Results are consistent with the indirect account, and may still be compatible with some version of the direct account. If monoclausal structures are required for extraction in these cases, and such structures are independently preferred in online processing, then processing differences should appear in online reading times.

## Self-Paced Reading study

**Predictions.** I assume a syntax-first incremental parser. Conjuncts in the Light condition are coordinated Low, as monoclausal structures. Thus Locality (ii) is satisfied. LightPP structures may optionally be analyzed as monoclausal structures, and such an analysis is favored by the parser. In either case, no reanalysis is required.

Lex & LexPP conditions cannot be construed as a single event and thus must be represented as biclausal structures, which in turn violates the Locality constraint. Expect that violation of the Syn-Sem constraint prompts syntactic reanalysis to a biclausal structure, which will be reflected in increased reading times.

**Materials & Method.** 60 UMass undergraduates participated in an online self-paced moving window task testing 24 quartets, crossing first conjunct verb (Light vs. Lexical) and presence of preposition (± PP).

(10) $/_1$ Abby loved her new computer.$/_2$ It was the one $/_3$ that she/ . . .
- A. went — Light
- B. went to the store — LightPP
- C. walked — Lex
- D. walked to the store — LexPP

. . . $/_5$ and bought __ $/_6$ after her boss $/_7$ gave her a raise./

**Results.** Mean reading times (and standard deviations) for regions of interest.

(11) $/_1$ Abby loved her new computer.$/_2$ It was the one $/_3$ that she/ . . .

| | Verb | Prep | Region 4 | Region 5 | Region 6 | Region 7 |
|---|---|---|---|---|---|---|
| A. | Light | N | went | 480 (205) | 579 (263) | 670 (296) |
| B. | Light | Y | went to the store | 555 (215) | 576 (256) | 635 (289) |
| C. | Lexical | N | walked | 545 (236) | 649 (282) | 709 (309) |
| D. | Lexical | Y | walked to the store | 615 (228) | 596 (276) | 665 (303) |

/. . . and bought / after her boss / gave her a raise./

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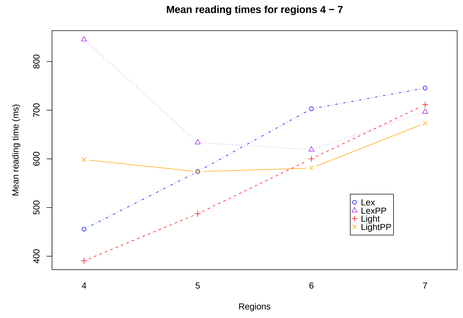
## Self-Paced Reading study (cont.)




Discarded scores above three standard deviations, resulting in < 2% loss/condition. Verbs in the Light/LightPP condition had much higher frequencies than those in the Lex/LexPP condition and could not be included in the model (colinearity violation). The length of Region 4 varied enough and so was computed in the model, with no significant effects in regions of interest, and thus was eliminated from the model. Linear Mixed-Effects models with Subjects & Items as random effects. '***' $p < 0.001$; '**' $p < 0.01$; '*' $p < 0.5$; '.' $p$ is marginal.

| | Predictor | Value | Std.Error | t-value | |
|---|---|---|---|---|---|
| **Region 5** | (Intercept) | 547.61 | 16.20 | 33.80 | *** |
| | verblight | -64.65 | 15.93 | -4.06 | *** |
| | preppp | 72.01 | 15.92 | 4.52 | *** |
| | verblight:preppp | 3.61 | 22.54 | 0.16 | |
| **Region 6** | (Intercept) | 652.19 | 21.20 | 30.77 | *** |
| | verblight | -69.53 | 18.77 | -3.70 | *** |
| | preppp | -50.77 | 18.74 | -2.71 | ** |
| | verblight:preppp | 45.92 | 26.44 | 1.74 | . |
| **Region 7** | (Intercept) | 714.15 | 23.19 | 30.79 | *** |
| | verblight | -20.89 | 21.05 | -0.99 | |
| | preppp | -43.69 | 21.02 | -2.08 | * |
| | verblight:preppp | -8.37 | 29.81 | -0.28 | |

**Summary.** Lex conditions show sustained integration costs, while the cost of LexPP conditions appear earlier, primarily on Regions 4 & 5. Light verbs (Light & LightPP) were read faster overall, with some increased reading time on Region 5, perhaps reflecting spillover from reading the extra PP on previous region.

**Follow-up.** If the parser was tempted to assign a gap to the first conjunct, the slowdowns on Lex/LexPP conditions could reflect the cost of an implausible gap assignment (Traxler and Pickering, 1996; Staub, 2007). An offline questionnaire (N = 20 UMass undergraduates; 24 items modified from Lex and LexPP conditions above) probed whether material on the first conjunct (± PP) would be a more tempting gap site.

(12) John found an old bottle of whisky. It was the one that he drove (to the park) and drank.

| What did John do? | Lex | LexPP |
|---|---|---|
| A. Drive the whisky bottle (to the park) | 1% | 0% |
| B. Drank the whisky bottle | 91% | 91% |
| C. Both | 0% | 0% |
| D. Neither | 8% | 9% |

**Summary.** The second conjunct is always the preferred gap location, regardless of whether a PP intervenes.

## Conclusion

Extraction from Ordinary coordination elicits interpretive and processing costs with respect to pseudo-coordination counterparts, as anticipated by the Event-Extraction Correlation. However, the results are consistent with the idea that event construal only indirectly licenses extraction. Two independent constraints must be jointly satisfied – a Syntax-Semantics Correspondence and a Syntactic Locality constraint on extraction. The processing effects observed in online reading are not necessary consistent with the view that event construal is encoded directly into a constraint on extraction.

**What form should the Syntax-Semantics Correspondence take?.** Two ideas:
1. **Counting Principle:** A counting domain cannot contain non-identical overlapping individuals (see Casati & Varzi, 1999; Spelke, 2003; Kratzer; 2008).
2. **Constraint on Perfective Aspect:** Perfective aspect requires a continuous running time that connects events.

## References

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