

# Extraction asymmetries in complex participle adjuncts

Andreas Kehl, University of Tübingen

In this talk, I will argue that extraction asymmetries observed in the literature for participle adjuncts do not need to be explained by additional syntactic or semantic licensing principles. The factors identified in the literature apply equally to the corresponding declarative structures. I will present experimental evidence indicating that factors like aspectual class and verb type show effects which are independent of whether the sentence appears in declarative or interrogative form. These results are in line with other approaches to islands which call into question the relevance of grammatical licensing principles.

## 1 Extraction from participle adjuncts

Long-distance dependencies such as *wh*-extraction into adjunct constituents are traditionally considered to be impossible in the generative framework, as stipulated in the *Condition on Extraction Domain* (CED, Huang, 1982). The existence of apparently grammatical extractions from some adjunct constituents, also in attested examples, has given rise to a rich literature on how these extractions can exceptionally be licensed in the grammar and what distinguishes good extraction candidates from bad ones.

I will argue that the grammatical licensing mechanisms suggested in the literature, whether they are formulated in syntactic or semantic terms, add complexity to the grammar that are unwarranted in the light of experimental evidence which suggests that the distinction between good and bad extraction candidates is independent of the application of extraction and also leads to acceptability differences in the declarative counterparts. This line of research ties in with the more general impetus in the discussion of island phenomena which has moved away from grammatical licensing principles towards accounts based on processing complexity and discourse factors that are independent of extraction (Abeillé et al., 2020; Chaves & King, 2019; Chaves & Putnam, 2020; Culicover, Varaschin, & Winkler, 2022; Culicover & Winkler, 2018, 2022; Hofmeister & Sag, 2010; Liu et al., 2022).

It has to be pointed out first that adjuncts come in a variety of shapes that seem to react differently to extraction: tensed adverbial clauses appear to resist extraction stronger than untensed adjunct clauses and are thus typically given in the literature as evidence for the validity of the CED. However, other data patterns observed in the literature suggest that there are additional extraction asymmetries within certain adjunct types that further complicate the empirical landscape because some extractions are considered to show a relatively high degree of acceptability whereas minimally different sentences do not. Truswell (2007), for example, observes that participial adjuncts modifying atelic main verbs like *work* in (1a) result in ungrammatical extractions, whereas extraction is fine if the main verb is telic like *arrive* in (1b):

- (1) a. \*What<sub>i</sub> did John work [whistling <sub>i</sub>]?  
b. What<sub>i</sub> did John arrive [whistling <sub>i</sub>]?

The declarative counterparts of these sentences in (2) are both considered grammatical, so that the grammaticality difference in interrogatives is a result of extraction:

- (2) a. John worked whistling a funny song.  
b. John arrived whistling a funny song.

There is a considerable number of approaches which explain the judgment differences in (1) by additional licensing principles that permit extraction in some cases but not others. In the case of Truswell (2007), extraction is only licensed if event-semantic conditions are fulfilled.

Depending on whether these event-semantic properties are encoded structurally (as for example in Borer, 2005 or Ramchand, 2008) or not, the application of locality operations needs to be enriched to include sensitivity to such properties.

There is a growing body of research into islands and related phenomena that seeks to provide alternative explanations for the observed judgment patterns. Particularly for the adjunct types discussed here, Brown (2017) proposes that acceptability differences in interrogative and declarative structures are related, meaning that the effects of telicity and transitivity determine acceptability in the presence and, crucially, also in the absence of extraction. I will argue that the observation in Brown (2017) about the relation between acceptability in declarative and interrogative participle adjuncts is on the right track and that additional licensing principles as in Truswell (2007) are not necessary; instead, the same acceptability contrasts reported for interrogatives appear in equal strength in the corresponding declaratives.

## 2 Experimental evidence

### 2.1 Method and design

To test the claim in Truswell (2007) that the aspectual class of the matrix predicate has an influence on the strength of extraction, an acceptability judgment experiment was conducted. The 2x2 factorial design, shown in (3), crosses the two factors TELICITY and STRUCTURE.

- |     |   |              |
|-----|---|--------------|
| (3) | a. Dennis came home eating ice cream.     | [telic/-wh]  |
|     | b. What did Dennis come home eating _ ?   | [telic/+wh]  |
|     | c. Dennis walked around eating ice cream. | [atelic/-wh] |
|     | d. What did Dennis walk around eating _ ? | [atelic/+wh] |

This allows to determine whether the aspectual class of the matrix predicate influences how strongly the application of extraction degrades the two declarative conditions. The research question was whether conditions with atelic matrix predicates are affected to a stronger degree by extraction than conditions with telic matrix predicates.

### 2.2 Participants and materials

Four lexicalizations of the four conditions were created, resulting in a total of 16 target items. They were distributed across four lists according to the Latin square design. 48 participants were recruited via Mechanical Turk and judged the 16 target items on a 7-point Likert scale. The experiment included 32 distractors with varying degrees of naturalness, including the 15 cardinal well-formedness sentences from Gerbrich, Schreier, and Featherston (2019) to anchor the scale. All items were randomized for each individual participant to avoid list position effects. Four participants were excluded from the statistical analysis because they indicated a native language other than English, another participant because of a technical problem with the experimental platform, and another four participants due to poor performance on the cardinal well-formedness sentences. This left 39 participants that were included in the statistical analysis.

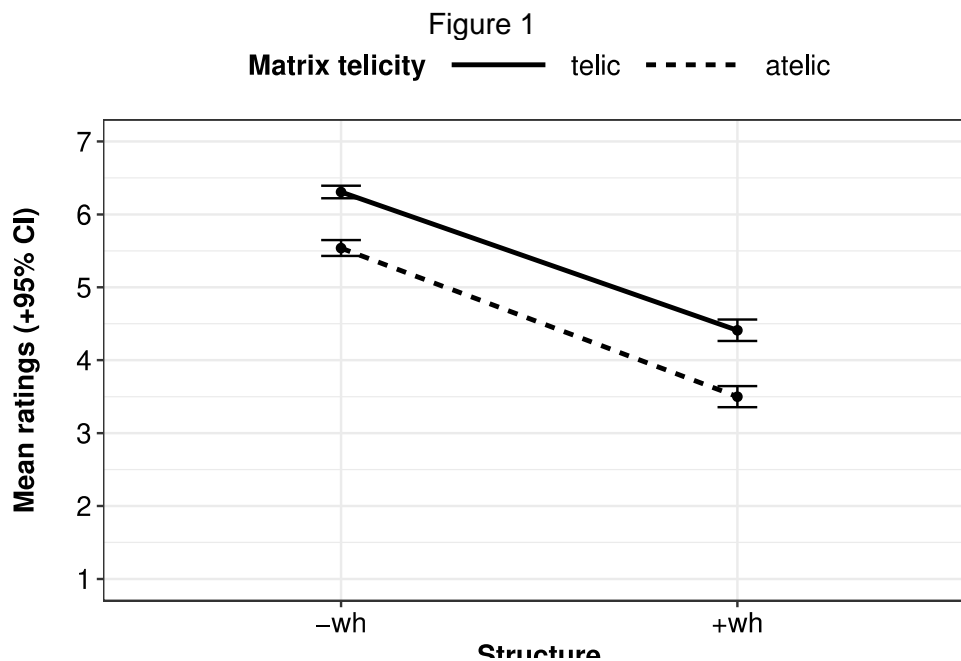
### 2.3 Results and analysis

The results are shown graphically in Figure 1 with untransformed mean ratings. It is clearly visible that interrogative conditions are judged less acceptable than declaratives, and that telic matrix predicates have an advantage over atelic ones; this advantage exists in both declarative and interrogative conditions.

A linear mixed effects model was fit over the data using the afex package (Singmann et al., 2020) in the R programming language (R Core Team, 2020, version 4.0.2); the model includes TELICITY and STRUCTURE plus their interaction as fixed effects as well as participants and items as random effects. Following Barr et al. (2013), the model includes the maximal random effect structure that led to model convergence in order to include as many sources of variability as possible (see Singmann & Kellen, 2020; Winter, 2020). The results show significant effects for TELICITY ( $\beta = .413$ ,  $t = 3.712$ ,  $p < .01$ ) and STRUCTURE ( $\beta =$

.995,  $t = 9.578$ ,  $p < .001$ ), but the interaction is not significant ( $\beta = .037$ ,  $t = .327$ ,  $p = .71567$ ). This means that the effect of TELICITY exists independently of extraction. This is not as predicted in Truswell (2007); Truswell is right about the advantage of telic matrix predicates over atelic ones, but this effect is not related to whether extraction has taken place or not.

Similar results are also obtained for the distinction between unaccusative, unergative, and transitive matrix predicates discussed in Borgonovo and Neeleman (2000). Again, the effect resulting from the verb type of the matrix predicate does not interact with that of extraction.



### 3 Discussion and conclusion

The experimental results confirm the hypothesis that the aspectual class of the matrix predicate has an effect that is independent of extraction. Truswell's (2007) judgment pattern in (1) and (2) may be the result of translating the gradient acceptability seen in the experiment to a binary distinction between grammatical and ungrammatical structures. Since both declarative conditions in the experiment show a fairly high degree of acceptability, they are both mapped to a grammatical judgment; as far as the interrogative conditions are concerned, a different mapping of the two conditions to grammatical for telic matrix predicates and to ungrammatical for atelic ones depends on where the cut-off line for the binary distinction is drawn.

The effect of telicity can be explained in terms of differences in the semantic compatibility between the two predicates, which is observable regardless of whether extraction has taken place or not. Relative acceptability in declaratives serves as a reliable predictor of acceptability differences in interrogatives. There is thus no need for a licensing principle that permits extraction if the matrix predicate is telic but not if it is atelic. These experimental results show that the individual differences between types of matrix predicate deserve closer attention independently of extraction, which can be captured by complexity differences as proposed in Culicover, Varaschin, and Winkler (2022).

### References

- Abeillé, A., Hemforth, B., Winckel, E., & Gibson, E. (2020). Extraction from subjects: Differences in acceptability depend on the discourse function of the construction. *Cognition*, 204, Article 104293. <https://doi.org/10.1016/j.cognition.2020.104293>

- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, 68(3), 255–278.
- Borer, H. (2005). *The normal course of events*. Oxford University Press.
- Borgonovo, C., & Neeleman, A. (2000). Transparent adjuncts. *Canadian Journal of Linguistics/La Revue Canadienne de Linguistique*, 45(3/4), 199–224.
- Brown, J. M. M. (2017). *Heads and adjuncts: An experimental study of subextraction from participials and coordination in English, German and Norwegian* [Doctoral dissertation, University of Cambridge].
- Chaves, R. P., & King, A. (2019). A usage-based account of subextraction effects. *Cognitive Linguistics*, 30(4), 719–750.
- Chaves, R. P., & Putnam, M. T. (2020). *Unbounded dependency constructions: Theoretical and experimental perspectives*. Oxford University Press.
- Culicover, P. W., Varaschin, G., & Winkler, S. (2022). The radical unacceptability hypothesis: Accounting for unacceptability without universal constraints. *Languages*, 7(2), Article 96. <https://doi.org/10.3390/languages7020096>
- Culicover, P. W., & Winkler, S. (2018). Freezing: Between grammar and processing. In J. M. Hartmann, M. Jäger, A. Kehl, A. Konietzko, & S. Winkler (Eds.), *Freezing: Theoretical approaches and empirical domains* (pp. 353–386). Mouton de Gruyter.
- Culicover, P. W., & Winkler, S. (2022). Parasitic gaps aren't parasitic, or, the case of the uninvited guest. *The Linguistic Review*, 39(1), 1–35.
- Gerbrich, H., Schreier, V., & Featherston, S. (2019). Standard items for English judgment studies: Syntax and semantics. In S. Featherston, R. Hörnig, S. von Wietersheim, & S. Winkler (Eds.), *Experiments in focus: Information structure and semantic processing* (pp. 305–328). de Gruyter.
- Hofmeister, P., & Sag, I. A. (2010). Cognitive constraints and island effects. *Language*, 86(2), 366–415.
- Huang, C.-T. J. (1982). *Logical relations in Chinese and the theory of grammar* [Doctoral dissertation, Massachusetts Institute of Technology].
- Liu, Y., Winckel, E., Abeillé, A., Hemforth, B., & Gibson, E. (2022). Structural, functional, and processing perspectives on linguistic island effects. *Annual Review of Linguistics*, 8, 495–525.
- R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. [www.r-project.org/](http://www.r-project.org/)
- Ramchand, G. C. (2008). *Verb meaning and the lexicon: A first phase syntax*. Cambridge University Press.
- Singmann, H., Bolker, B. M., Westfall, J., Aust, F., & Ben-Shachar, M. S. (2020). *afex: Analysis of factorial experiments* [R package version 0.22-2]. <https://cran.r-project.org/package=afex>
- Singmann, H., & Kellen, D. (2020). An introduction to mixed models for experimental psychology. In D. Spieler & E. Schumacher (Eds.), *New methods in cognitive psychology* (pp. 4–31). Routledge.
- Truswell, R. (2007). Extraction from adjuncts and the structure of events. *Lingua*, 117, 1355–1377.
- Winter, B. (2020). *Statistics for linguists: An introduction using R*. Routledge.