Backgroundedness Predicts Island Status of Non-finite Adjuncts in English

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Abstract

The current work tests the hypothesis that the island status of clausal adjuncts, as determined by judgments on *wh*-questions, are predicted by the degree of "backgroundedness" of the adjuncts, as determined by a separate negation task. Results of two experiments support the hypothesis that acceptability of extraction from adjuncts in *wh*-questions is inversely correlated with the degree to which the adjunct is backgrounded in discourse. Taken together, results show that temporal clausal adjuncts (headed by *before, after, while*) are stronger islands than adjuncts that are causal (here, headed by *to* or *by)*. This demonstrates that adjuncts differ in degree of island status, depending on their meaning, despite parallel syntactic structure.

Keywords: islands, discourse constraints, backgroundedness, communication

Introduction

To interpret an event, comprehenders typically need to understand who did what to whom. Depending on context, they may also what to know when, why, where, or how an event occurred. The latter type of content is commonly expressed by phrases that are referred to as "adjuncts." In (1), for instance, each of the underlined phrases are adjuncts.

(1) Keisha drove to NYC <u>on Sunday</u> <u>after moving from NJ</u> <u>in order to graduate early</u>.

Adjuncts are rarely obligatorily expressed, a fact sometimes considered criterial for adjunct status. For instance, someone who hears the sentence *Keisha changed classes* may not need to know, and may not care, where, when or why Keisha changed classes. When adjuncts *are* expressed, they are generally further from the main verb than "core" arguments are, an iconic reflection of their less central semantic functions. The semantic status of adjuncts is also reflected in terminology used by grammar teachers and syntacticians. Adjuncts are more "peripheral" to the clause (van Valin, 1998), and adjuncts that express clauses themselves are "subordinate" to the "main" clause.

Aside from the idea that adjuncts are less central to the expression of events, generalizations that hold across all adjuncts are rare, as a variety of forms and meanings fall under the heading of *adjunct*. For example, adverbs are typically considered to be adjuncts, but adverbs are in certain cases obligatory (*He dresses well*. *?He dresses*) (Degen, Hawkins, Graf, Kreiss & Goodman, 2020; Goldberg & Ackerman, 2001). Clauses with adjunct-like meaning are not necessarily formally subordinate and may instead stand on their own (Evans & Wantanabe, 2016). Finally, phrases that encode an "instrument" (e.g., *with a spoon/hammer*) are more adjunct-like when used with some verbs (e.g., *eat)* and more central to the event when used with other verbs (e.g., *smash*) (Koenig, Mauner, Bienvenue & Conklin, 2008).

The current paper examines a way in which certain phrases that function uncontroversially as adjuncts, and which share certain formal properties with one another -- all are non-obligatory, nonfinite clauses -- nonetheless vary in terms of the extent to which they display a certain property: that of being an "island."

Islands are constructions that are opaque to long-distance (semantic) dependencies (LDDs), often referred to as "extraction." Linguists since Cattell (1976) have generally taken for granted that clausal adjuncts are islands in that no constituent from *within* a clausal adjunct may be extracted. And in fact, as confirmed in Experiment 1, English speakers find (2) to be less acceptable than main clause extraction (3):

(2) ? <u>Where</u> did Keisha drive to NYC after moving from __?

(3) <u>Where</u> did Keisha drive __ after moving from New Jersey?

Until fairly recently, it has been widely assumed that clausal adjuncts are uniformly opaque to extraction across constructions (being "strong" islands, see Szabolcsi & Lohndal, 2017 for discussion). But the reason *why* certain constructions are "islands" to LDDs has remained debated. Most approaches to islands have argued for a general syntactic explanation (e.g., Ross 1967; Nunes & Uriagereka,

2000; Takahashi, 1994). These approaches argue that island status is determined by an abstract formal relationship between a phrase's canonical position and the position in which it is ultimately expressed. But other proposals have aimed to account for islands by appealing to functional or discourse-pragmatic constraints (Abeillé, Hemforth, Winckel & Gibson, 2020; Ambridge & Goldberg, 2008; Chaves & Putnam, 2021; Cuneo & Goldberg, this volume; Deane, 1991; Erteschik-Shir, 1979; Erteschik-Shir & Lappin, 1979; Goldberg, 2006; 2013; Kuno, 1987; Liu, Ryskin, Futrell & Gibson, 2022).

LDDs are not equivalently banned for all adjuncts, contra previous claims about their status as strong islands. Instead, certain discourse-pragmatic and/or semantic contexts make LDDs involving certain adjuncts relatively acceptable (e.g., Chaves & Putnam, 2021; Truswell, 2007a, b, 2011). Additionally, variation in judgments of LLDs involving adjuncts has been found across languages (e.g., Kohrt, Sorensen & Chacón, 2018 for English; Bondevik, Kush & Lohndal, 2021 for Norwegian; Müller, 2017, 2019 for Swedish; Pañeda, Lago, Vares, Veríssimo & Felser, 2020 for some varieties of Spanish). Thus, we ask: What are the factors that contribute to the variation in acceptability of LDDs involving adjuncts in English? Insofar as clausal adjuncts are similar or identical in form, what is the role of *non-syntactic* factors in explaining the variation across sentences (McInnerney & Sugimoto, 2022)?

Digging Deeper into Backgroundedness

In Experiment 1, we investigate two (non-mutually-exclusive) hypotheses about factors affecting the acceptability of extraction from adjuncts. The *Backgrounded Constituents are Islands* (BCI) hypothesis claims that island constructions follow from a discourse-pragmatic property of being "backgrounded" in discourse (Goldberg, 2006). This perspective argues that so-called island effects arise from a pragmatic incompatibility between the functions of the constructions involved. For instance, the extent to which a construction backgrounds its content in discourse should vary inversely with the extent to which it can felicitously be focused in a *wh*-question (see also, Erteschik-Shir, 1979). In favor of a discourse-pragmatic proposal, scholars have argued that unacceptability of islands falls on a gradient that depends on the functions of the constructions involved (Abeillé et al., 2020; Cuneo & Goldberg, this volume; Deane, 1991; Erteschik-Shir, 1979; Kuno, 1987).

We operationalize this notion following in the spirit of Erteschik-Shir (1979)'s "lie" test: we rely on main clause negation to test the extent to which a construction is backgrounded in discourse (Ambridge & Goldberg, 2008; Goldberg, 2006, 2013). For instance, the event conveyed by the relative clause in (4a) is relatively unaffected by main clause negation (4b). The same negation test is used to identify presuppositions, although unlike traditional accounts of presupposition, backgroundedness is a matter of degree.

(4) (a) I read the book that Maya loaned me. →
        Maya loaned me the book
    (b) I didn't read the book that Maya loaned me. →
        Maya loaned me the book

This approach predicts that the extent to which a construction is backgrounded in discourse predicts the extent to which it is an island. While the claim appeared to be supported by a study of verb complement clauses (Ambridge & Goldberg, 2008), this interpretation has been challenged due to a lack of super-additive effects, indicating that verb complement clauses may not be islands after all (Liu et al. 2022; Cuneo & Goldberg, this volume). That is, as articulated by Sprouse, Wagers and Phillips (2012), true islands should be less acceptable than expected, based on the acceptability of a corresponding non-LDD. This predicts an interaction when judgments are predicted by sentence type (LDD vs. non-LDD) and island status.

The second hypothesis investigated in Experiment 1 is loosely inspired by Truswell (2007a, b, 2011) and Ernst (2022), who specifically focus on adjunct clauses. Their *Event Structure* claim is that constructions are less island-like to the extent that a non-finite adjunct clause is construed to involve a single "macro-event" in combination with the main clause event it is modifying. Truswell calls this *The Single Event Condition*, which states "a *wh*-chain is legitimate only if the minimal constituent containing the head and foot of the chain asserts the existence (in the actual world) of a single event" (Truswell, 2007a, p. 240).

While the semantic details of this proposal rely on theory-internal machinery, one can view the claim as related to the idea of backgroundedness. That is, in cases where the verbs in the adjunct and the main clause are interpreted as parts of the same event, the adjunct is not as backgrounded as it would be in cases in which they are interpreted as two separate events. In the current context, we operationalize whether two subevents are considered one event or two via a temporal overlap test: Participants were asked to rate the degree to which the adjunct and the main clause occurred at the same time.

As stated earlier, the BCI and the Event Structure hypotheses are not necessarily mutually exclusive. Since we have independent measures for both, in Experiment 1, we investigate whether the negation test and the event structure test are equally predictive for LDDs from non-finite adjunct clauses. In particular, we predict that (i) the Negation test will be inversely correlated with the acceptability of the interrogative sentences where the gap is in the non-finite adjunct clauses (e.g., *to/before/after/while* clauses), in comparison to declarative sentences, and that (ii) the Event test should show a similar result.

In what follows, we leverage the fact that adjuncts vary in terms of the content they express. Experiment 1 compares nonfinite clausal adjuncts headed by *to*, *before*, and *after*, while Experiment 2 compares non-finite clausal adjuncts headed by *while* and *by*. To foreshadow the results, Experiment 1 reveals that the negation test predicts island status and does so better than the temporal overlap test. Therefore, only the negation task is used in Experiment 2. While the adjunct types in Experiment 1 vary semantically *and* formally, those in Experiment 2 only differ semantically. That is, clausal adjuncts headed by *to* include bare verb forms, whereas those headed by *before, after, while* and *by* all include verbs in the progressive form.

Pre-registration The design, stopping rule, and analyses for both experiments were preregistered (https://osf.io/nwdyx, https://osf.io/gpm6j/).

Experiment 1

Experiment 1 employed a 2x1 design, crossing SENTENCE TYPE (declarative vs. *wh*-question) with DEGREE OF BACKGROUNDEDNESS (measured via the negation task and the temporal overlap task).

Participants 128 English-speaking participants were recruited via Prolific.co. A separate group of 96 participants were recruited for the negation task, and a final group of 80 was recruited for the temporal overlap task.[1]

Stimuli Two types of non-finite adjunct clauses were included: *to V*; *before/after Ving* (Table 1).

Table 1: Sample stimuli varying in sentence type (declarative vs. *wh*-question) and adjunct clause type, used to collect acceptability judgments in Experiment 1.

D vs Q	*to V*	*before/after Ving*
Declarative	The mechanic changed classes to meet the engineer.	The mechanic changed classes after meeting the engineer.
WH-Q	Who did the mechanic change classes to meet?	Who did the mechanic change classes after meeting?

32 declarative sentences and 32 adjunct-extracted *wh*-questions were recorded and distributed across 4 lists pseudo-randomly using a Latin Square design. Participants heard 16

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[1] The number of participants varied across experiments due to different demands for counterbalancing.

declaratives and 16 questions (never the declarative and question for the same item), along with 48 fillers, which varied in acceptability.

Procedure Participants rated the acceptability of all sentences on a 1-7 Likert scale, and a separate group rated the extent to which main clause negation implied that the adjunct clause was negated on a 5-point scale (Figure 1).

Please think about what the following sentence means:

The attendant didn't arrange flowers after wooing the gardener.

Did the attendant woo the gardener?

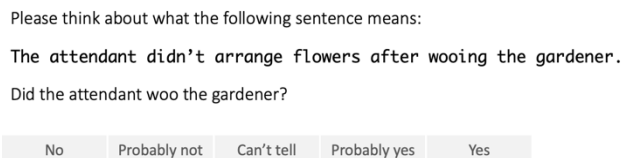| No | Probably not | Can't tell | Probably yes | Yes |

Figure 1: Example negation task stimulus.

A third group of participants rated how likely the events in the main clause and the adjunct clause were to occur at the same time on a 5-point scale (see Figure 2).
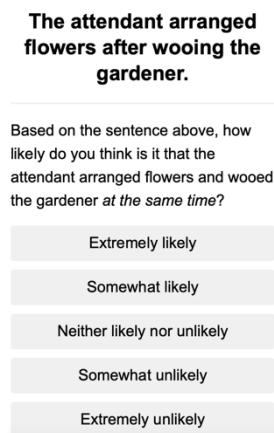
The attendant arranged flowers after wooing the gardener.

Based on the sentence above, how likely do you think is it that the attendant arranged flowers and wooed the gardener *at the same time*?

Extremely likely

Somewhat likely

Neither likely nor unlikely

Somewhat unlikely

Extremely unlikely

Figure 2: Example temporal overlap task stimulus.

Results and Discussion: Experiment 1

Both the negation test and the temporal overlap measure proved predictive of the acceptability of adjunct-extracted sentences more than declarative sentences, as hypothesized. Specifically, following the preregistration, linear mixed effects models were fit for each measure: fixed effects = z-scored rating, Sentence_Type [Declarative vs. WH-Q], and Backgroundedness_Measure, with random intercepts for items and participants. Model comparison via ANOVA confirmed a significant interaction between Sentence Type and judgments on the negation task compared to the additive model ($\chi2 = 20.5$; $df = 1$; $p < 0.001$; Figure 3).
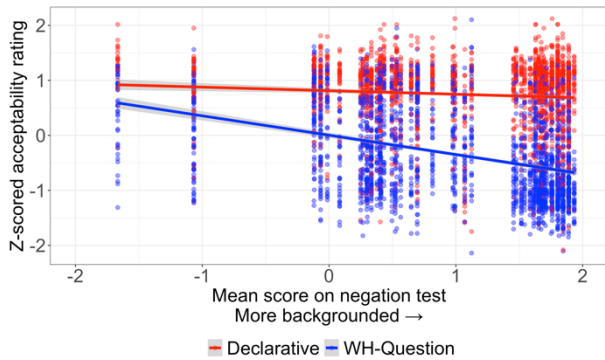
Figure 3: Exp. 1: Negation task predicts acceptability ratings on *Wh*-questions more than Declaratives.

In Figure 3, the x-axis represents the degree to which negating the main clause was interpreted as negating the adjunct clause (higher = less negated, more backgrounded); y-axis: z-scores of acceptability ratings.

Similarly, model comparison via ANOVA confirmed a significant interaction between temporal overlap ratings and Sentence_Type compared to an additive model ($\chi2 = 6.49$, $df = 1$, $p < 0.011$; Figure 4). In Figure 4, the x-axis represents the degree to which the main clause and adjunct clause were interpreted as occurring at the same time (lower = less overlap/more backgrounded); y-axis: z-scores of acceptability ratings. The lines represent smoothed linear model fits.
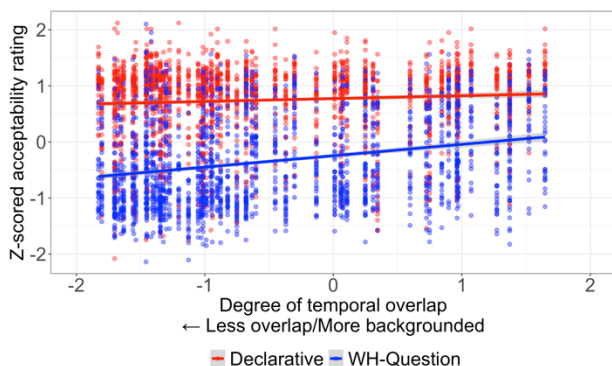

Figure 4: Temporal overlap test predicts acceptability ratings on *Wh*-questions more than Declaratives.

That is, the extent to which an adjunct was unaffected by main clause negation was inversely correlated with independent judgments on the corresponding *wh*-question (adjunct extraction). And, the extent to which an adjunct was interpreted as non-overlapping temporally also inversely correlated with judgments on extractions. Since adjunct types varied categorically (*to V* vs. *before/after Ving* adjuncts, Table 1), we tested whether the continuous backgroundedness measures predicted ratings above and

beyond adjunct type, by including adjunct type as well as backgroundedness and sentence type as fixed effects. To do this, we fit a linear mixed effects model similar to those described above (fixed effects = z-scored rating, Sentence_Type [Declarative vs. *Wh*-Q], with random intercepts for participants and items), and included Clause_Type (*to V* vs *before/after Ving*) as a fixed effect interacting with Sentence_Type. We then compared this model to models which were exactly the same but included either the negation test scores or temporal overlap. Model comparison was done via ANOVA function. Results showed the negation test did predict acceptability over and above clause type ($\chi2 = 7.603$; $df = 1$; $p < 0.006$) but the temporal overlap measure did not ($\chi2 = 2.319$; $df = 1$; $p = 0.128$). As is evident in Figure 5, *Ving* adjuncts were all quite backgrounded according to the negation test, while the *to V* adjuncts varied quite a bit across items and were overall more affected by main clause negation.
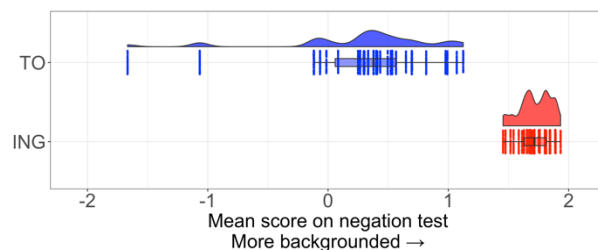

Figure 5: Negation test by clause type.

In hindsight, temporal overlap may not have been the ideal test of whether events in main and adjunct clauses describe a single event. Two independent events may occur at the same time (*The MSNBC program was aired at the same time as a CBS program*). Conversely, non-temporally overlapping subevents are construable as a single event: for example, hiring a contractor and the resulting change are conflated in: *She remodeled her kitchen*. Future work needs to operationalize the extent to which the main and adjunct clause are construed as a single event in other ways.

Since the negation test predicted island status in Experiment 1 better than the temporal overlap test, we used only the negation task in Experiment 2 to further explore possible variation within clausal *Ving* adjuncts.

Experiment 2

Experiment 2 offers a quite stringent test of the claim that the degree of backgroundedness, as measured by the negation task, predicts island status of clausal adjuncts. This is because all clausal adjuncts used share the same surface form. They all involved a verb in gerund form (*Ving*), the same form used in Experiment 1 that had shown little variability on the negation task. In particular, the *Ving* adjuncts in Experiment 1 were uniformly backgrounded: they were unaffected by

main clause negation (Figure 5). The only difference among stimuli in Experiment 2 lies in whether the adjuncts are headed by *while* or *by*. We investigate whether the negation test is predictive when *Ving* adjuncts headed by *while* and *by* are compared.

Participants We ran 180 English speakers on AMT via the Cloud Research platform (Litman & Robinson, 2020). Since AMT can be less reliable than other platforms (Peer, Brandimarte, Samat & Acquisti, 2017), we excluded participants who responded to catch trials with lower than 75% accuracy. This left us with 145 participants on the acceptability task. For the negation task, 182 English speakers were run; after the same exclusions, 178 participants were analyzed.

Stimuli Experiment 2 investigated non-finite adjunct clause types headed by *while* or *by* (see Table 2). As in Experiment 1, 32 declarative and 32 adjunct-extracted sentences were recorded and distributed across 4 lists pseudo-randomly using a Latin Square design. Participants heard 16 items from each sentence type (no more than one type for any item), and 48 fillers which varied in acceptability.

Table 2: Sample stimuli used to solicit acceptability judgments in Experiment 2.

D vs Q	*While Ving* Adjuncts	*By Ving* Adjuncts
Declarative	The custodian unlocked the door while admitting the manager.	The custodian unlocked the door by admitting the manager.
WH-Q from adjuncts	Who did the custodian unlock the door while admitting?	Who did the custodian unlock the door by admitting?

Results and Discussion: Experiment 2

The same preregistered analysis was run as in Experiment 1. Responses were z-scored and linear mixed effects models were fit (fixed effects = z-scored rating, Sentence_Type [WH-Q vs declarative], and Negation scores), with random intercepts for participants and items. As hypothesized, model comparison via ANOVA finds the predicted interaction between judgments on the negation task and Sentence_Type as compared to an additive model in the expected direction ($\chi2 = 4.04$, $df = 1$ $p = 0.044$). In Figure 6, the x-axis is the degree to which negating the main clause was interpreted as negating the adjunct clause (higher = less negated, more presupposed, more backgrounded); y-axis shows z-scores of

acceptability ratings. As in Experiment 1, the negation test significantly predicts the island status of the clausal adjuncts tested in Experiment 2.
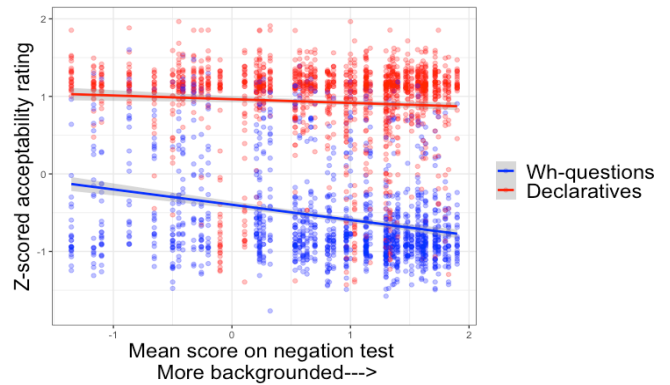

Figure 6: Exp. 2: Negation task predicts acceptability ratings on *Wh*-questions more than Declaratives.

Conclusion

We report two preregistered studies that ask whether the degree to which non-finite adjunct clauses are judged to be islands is predicted by those adjuncts' discourse functions. As is standard, island status was measured by a comparison of acceptability ratings on *wh*-questions and declarative clauses. In each *wh*-question, a constituent within the adjunct was semantically dependent on an initial *wh*-word. *Wh*-questions that involve legitimate islands should be judged worse than can be expected on the basis of their corresponding simple declaratives.

The results of Experiment 1 demonstrate that, as predicted, two semantic tasks correlated inversely with the degree to which *wh*-questions were judged to involve island violations. The first semantic task was aimed to measure whether the main and adjunct clause were construed as a single event, by asking participants to judge the extent to which the events of the main clause and adjunct clause overlapped temporally. The second task estimated the extent to which the adjunct clauses were negated by main clause negation. Results showed that both tasks predicted island status, but the negation task predicted island status more strongly than the temporal task, and only the negation task was predictive beyond above and beyond the difference in syntactic form of the adjuncts (*to V* vs *Ving*). For these reasons only the negation task was used in Experiment 2.

Experiment 2 provides an especially rigorous test of the negation task because all stimuli were non-finite adjuncts of the same *Ving* form. Not only was the syntactic form of the adjuncts controlled for, but the syntactic form chosen had shown very little variation in the negation task of Experiment 1 (recall Figure 5). Nonetheless results show the predicted interaction in the predicted direction, indicating that the *Ving*

adjuncts that are less affected by main clause negation are judged less acceptable in corresponding *wh*-questions.

Experiments 1 and 2 support the claim that observed variation in the degree of island-status across clausal adjuncts is influenced by the extent to which the adjuncts are backgrounded in discourse. The negation task, used as a measure of degree of backgroundedness, accurately predicted that *to V* adjuncts should be less island-like than *before/after Ving* adjuncts in Experiment 1. The *Ving* adjuncts in Experiment 1 were uniformly impervious to main clause negation and were judged more island-like in comparison to *to V* adjuncts. Experiment 2 took a closer look at *Ving* adjuncts, varying whether they were headed by *while* or *by*. We again find the negation test predicted the degree of island status within this set of *Ving* adjuncts. That is, clausal adjuncts are not all islands to the same extent. Those adjuncts that are more backgrounded in the discourse are more island-like.

Reviewing the types of adjuncts tested and results of both studies, we suggest that a distinction can be drawn between temporal adjuncts (headed by *before, after* or *while*) and adjuncts that are interpreted as causally related to the event in the main clause (here, headed by *while* or *by*). That is, *to V* adjuncts are purpose clauses which describe a reason why the main clause event took place, while *by Ving* adjuncts provide the means by which the main clause event took place. In this way, the current work provides evidence for systematic differences between temporal adjuncts on the one hand (headed by *before, after, while*) and causal adjuncts on the other. In particular, adjuncts which designate an event that is causally related to the main event are less island-like than adjuncts that are only temporally related. Thus, the current work lends support to the claim that non-finite adjunct clauses are islands for *wh*-questions to the extent they offer only incidental temporal information rather than causally related information. When considered this way, we can see that the current results are consistent with Truswell's (2007a, b, 2011) point that extraction from single complex events is more acceptable than extraction from any secondary independent event.

Support for the idea that causal relations play a special role in what can be considered a single event comes from independent work on the way in which verbs are allowed to combine with argument structure constructions in English (Croft, 2001; Goldberg, 1998). Verbs may lexically encode the means or result of the action typically expressed by an argument structure construction rather than the action itself. For instance, if we assume that a V NP PP construction in English conveys "caused-motion", we can see that its meaning can combine with verbs that designate the means of transfer, e.g., "She coughed the bug out of her mouth" (*coughing* = the means of causing motion). As such, this work underscores the importance of causal relations in what can count as a single event across empirical domains.

The current work is limited in several ways. We tested a single LDD construction—*wh*-questions—but distinct LDD constructions may combine with adjuncts in different ways (Abeillé et al., 2020; Sag, 2010). Future work should also include other adjunct types and test effects in other languages. The current work does not investigate processing-relevant factors such as frequency (e.g., Chaves & Dery, 2019; Dąbrowska 2013; Liu et al. 2022) or working memory (Deane, 1991; Casasanto, Hofmeister & Sag, 2010). Finally, while the analyses in Experiment 1 and 2 are identical, there are dissimilarities between surveys (e.g., different numbers of participants).

Nonetheless, the current work provides evidence in support of both the negation test as a measure of backgroundedness and the claim that constructions that are more backgrounded in discourse are less available for long distance dependencies. We also find suggestive evidence that causally related subevents are more naturally treated as single events for the purposes of *wh*-extraction in comparison with non-causal, temporally related events. The current foray into the forest of adjuncts indicates that even adjuncts with the same or similar syntactic structures differ in how they interact with long-distance dependencies based on their functions. As comprehenders seek to not only understand who did what to whom, but also integrate the information contained in the clauses tested here, the functional properties of such clauses need to be recognized, as formal properties are insufficient to account for island effects.

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