

Definite DP island effect across dependency types

Zheng Shen and Meghan Lim

National University of Singapore

Abstract

The source of island constraints in filler-gap dependency is under debate. Syntactic analyses of island effects propose that island constructions are opaque to all types of filler-gap dependency regardless of their discourse functions. On the other hand, a recent discourse-based analysis, the Focus-Background Conflict (FBC) constraint proposed in Abeillé et al. 2020, argues that some island effects result from a conflict between the discourse status of the island construction and the discourse function of certain filler-gap dependencies. Abeillé et al. (2020) explicitly argue that island effects under the FBC constraint are predicted to only show up in filler-gap dependencies involving focus, e.g. *wh*-questions; and should be absent in constructions like relative clauses where a dependency is established but its discourse function does not involve focus.

This paper uses the definite DP island in English as a case study to evaluate these distinct predictions. Abeillé et al. (2020), citing Grosu (1981), claims that the definite DP island effect only holds of *wh*-questions and not relative clauses, thus is also accounted for by the FBC constraint, whereas its effect in a relative clause was observed since Ross (1967). This paper teases apart the contradictory empirical claims with experimental methods. We show that both focus move-

ment in wh-questions and non-focus movement in relative clauses show the definite island effect, challenging Abeillé et al. (2020)'s approach to locality restrictions.

1 Theories on the sources of island effects

Filler-gap dependencies are constrained by locality restrictions, commonly known as island effects. Sentences in (1) showcase the subject island effect where wh-movement out of the subject in (1a) is unacceptable whereas movement out of the object in (1b) is acceptable.

- (1) Subject island (Chomsky 1973)
- a. *Who did [stories about ____] terrify John?
 - b. Who did you hear [stories about ____]?

Although an abundance of generalizations on island effects across languages have been claimed over the past 60 years, the source of these effects continues to be debated. Analyses under the structural approach to islandhood, for example, propose that island-inducing constructions (e.g. subjects in (1)) are structurally opaque to filler-gap dependencies. This general approach predicts that movement across islands is blocked regardless of the discourse or semantic function of the movement. For specific analyses of island effects that take such a structural approach, see Chomsky (1973); Rizzi (1990); Huang (1982); Müller (2011) among many others.

The recent discourse-based approach proposed by Abeillé et al. (2020, 2022), on the other hand, relates island effects to discourse properties of the construction and movement. According to this approach, the island effect arises when the discourse status of the island construction is at

odds with *the discourse function of the movement*. Specifically, the authors propose the constraint in (2) to account for the subject island effect in (1) as well as adjunct island effects:

- (2) Focus-background conflict (FBC) constraint: A focused element should not be part of a backgrounded constituent.

Abeillé et al. (2020) claim that the subject of a sentence is usually backgrounded while the *wh*-element in *wh*-questions is focused. Thus the FBC constraint predicts a penalty in sentences with *wh*-movement out of the subject as is shown in (3a). On the other hand, movement that does not involve a focused element would not violate the FBC constraint. Relative clauses in English, for example, involve movement, but the extracted element is not focused. The FBC constraint thus predicts that relative clauses with movement from the subject is acceptable shown in (3b). Experimental data from English and French in Abeillé et al. 2020 confirm the contrast in (3).

- (3) a. *Of which sportscar did the color ____ delight the baseball player because of its surprising luminance?
b. The dealer sold a sportscar, of which the color ____ delighted the baseball player because of its surprising luminance.

This contrast in (3) is unexpected under various approaches to islands, including the structural approach mentioned above, as well as other discourse-based analyses. The dominance analysis by Erteschik-Shir and Lappin (1979) and Erteschik-Shir (1981) and the backgroundedness analysis by Goldberg (2006) and Cuneo and Goldberg (2023), for example, argue that island effects result from the backgroundedness of the island construction (the subject in (3)). Nevertheless, both analyses

predict island effects in relative clauses and wh-questions alike, as they assume that the restriction applies to movement in general regardless of its discourse function. As far as we are aware, Abeillé et al. (2020)’s FBC analysis is unique in predicting the contrast between wh-questions and relative clauses. In other words, contrasts like (3) pose a challenge to almost all other analyses of island effects, structural or otherwise.¹

Against this background, it is important to investigate how the FBC constraint fares with other island effects. This paper evaluates the FBC constraint with data from the definite DP island effect, another island effect that has been argued to fall under the FBC analysis (Abeillé et al. 2020). Our contribution is two-fold: 1. we provide novel experimental evidence that the definite DP island affects wh-questions and relative clauses alike; 2. we argue that the findings pose a challenge to the FBC analysis of the definite DP island.

2 Definite DP island effect

The definite DP island effect, observed since Ross (1967) as well as Chomsky (1973, 1977), refers to the contrast in (4): movement out of definite DP objects is degraded (4b), as opposed to movement out of indefinite objects (4a).

(4) Abeillé et al. 2020, ex. 39a,b

a. Which actress did you buy [a picture of ____]?

b. #Which actress did you buy [that picture of ____]?

¹The debate over the subject island and the adjunct island is not the focus of this paper. See McInnerney and Sugimoto (2022) for arguments that the contrast in (3) results from a confound and is compatible with non-FBC analyses, as well as evidence against the FBC constraint. See Šimík et al. (2022) for evidence against the FBC analysis for adjunct island effects. See Cuneo and Goldberg (2023) for experimental evidence against the FBC analysis for adjunct island effects among others.

Abeillé et al. (2020) explicitly claim that the definite DP island ‘follows naturally from the FBC constraint’ (p20), citing the contrast between (4) and (5) from Grosu (1981). According to these judgments, although wh-movement out of the definite object is unacceptable, relativization out of the definite object is acceptable. The FBC analysis for this island effect would be similar to the one for the subject island: the definite object introduces backgrounded information while the wh-element conveys focus, so sentences like (4b) would violate the FBC constraint. Indefinite objects, on the other hand, introduce a new entity, and are thus compatible with the wh-element as in (4a). When the movement does not involve focus, e.g. in relativization, the FBC constraint is not applicable regardless of the definiteness status of the object, so movement out of both types of objects is OK shown in (5).

(5) Abeillé et al. 2020, ex. 39c

- a. That is the actress who I bought [a picture of ____].
- b. That is the actress who I bought [that picture of ____].

However, the original observation of the definite DP island effect by Ross (1967) claims that this effect is present in relative clauses as well as wh-questions. Sentences in (6) show the island effect in relative clauses.

(6) Ross 1967, 224

- a. The man who I gave John a picture of ____ was bald.
- b. ??The man who I gave John this picture of ____ was bald.

Based on the contrast in (4) and (6), structural analyses propose that definite objects are structurally different from indefinite objects. For example, Davies and Dubinsky (2003), following Bowers (1987), propose that indefinite objects are NPs while definite objects are DPs. NP objects are not blocking categories while DP objects are, thus movement out of definite DPs induces a subjacency violation. In more contemporary terms, Jiménez-Fernández (2012) proposes that indefinite objects are not a phase while definite objects are. Movement out of a definite object thus violates the Phase Impenetrability Condition (Chomsky 2000) while movement out of indefinite ones does not. Beyond these syntactic analyses, previous semantic or discourse-based analyses of the definite DP island effect also predict the effect to be present in relative clauses. Fiengo and Higginbotham (1981) propose a semantic constraint, the Specificity Condition, for the definite DP island effect, arguing that operator-variable binding relations cannot cross a definite DP boundary. The discourse-based dominance analysis by Erteschik-Shir and Lappin (1979) argues that elements within a dominant NP cannot be extracted, and definite objects are dominant, thus inducing the island effect.

The debate between the FBC approach and other analyses of the definite DP island effect thus boils down to an empirical question. The former does not predict an island effect in relative clauses while the latter predicts an island effect. Although the definite DP island effect has been experimentally verified in a few studies (Keller 2000; Neal and Dillon 2021; Tollan and Heller 2015; Shen and Lim 2022; Huang 2022; Shen and Huang 2023), all of these works consider only *wh*-movement. To our knowledge, there is yet to be any previous experimental studies on the definite DP island effect in relative clauses or other types of movement.²

²Cuneo and Goldberg (2023) tested restrictions including Adjunct Island, Complex NP island, and factive island on both *wh*-questions and relative clauses and found the island effects in both constructions, challenging the FBC approach. The logic of the experiments in Cuneo and Goldberg (2023) is similar to this paper in that restrictions in

In the following sections, we report four experiments testing the definite DP island effect in *wh*-questions and relative clauses, addressing both the empirical and the theoretical debate. To preview the results, the definite DP island effect is observed in both *wh*-questions (Experiment 1) and relative clauses (Experiment 2) alike, with no contrast found between the movement types.

In addition to P-stranding configurations, we also tested PP movement in the context of the definite DP island as shown in (7) (Experiment 3-4). The inclusion of PP movement is motivated by the experiments in Abeillé et al. (2020). They demonstrate that while PP movement out of subjects shows a contrast between *wh*-questions and relative clauses, P-stranding movement out of subjects is unacceptable regardless the construction. Our experiments show the definite DP island effect in both P-stranding and PP movement alike, contrary to the predictions of the FBC analysis (more details in Section 3.3).

- (7) a. **About which country** did you see [a/that movie ____].
 b. That is the nation **about which** I saw [a/that movie ____].

3 Experiments

3.1 Experiment 1: *wh*-movement out of definite DPs

Experiment 1 compares the acceptability of movement out of the indefinite objects and definite objects in *wh*-questions. Given that all previously discussed theories of the definite DP island effect predict an island effect in *wh*-questions, Experiment 1 simply establishes a baseline for what

wh-questions and relative clauses are compared, however, except for the adjunct island, the islands tested by Cuneo and Goldberg (2023) are not explicitly claimed by Abeillé et al. (2020) to result from the FBC constraint. The definite DP island, on the other hand, is claimed by Abeillé et al. (2020) to be subsumed under the FBC constraint.

the definite DP island effect would look like in our the experimental design.

3.1.1 Design and materials

Following previous experimental work on island effects (Sprouse et al. 2016 among others), the 2x2 factorial design manipulates two independent factors. First, NP TYPE: the definiteness of the object: (indefinite vs. definite). Second, DEPENDENCY LENGTH: whether the sentence involves movement of the subject or movement out of the object (short vs. long). This gives us four conditions in (8): (i) a sentence with an indefinite object but no movement out of it (8a), (ii) a sentence with a definite object but no movement out of it (8b), (iii) a sentence with an indefinite object and movement out of it (8c), and (iv) a sentence with a definite object and movement out of it (8d). The gap (___), indicating the original position of the *wh*-element, is for illustrative purposes only and was not included in the stimuli.

- (8) a. I wonder which journalist ___ watched a movie about Wonder Woman. (IND.SHORT)
b. I wonder which journalist ___ watched that movie about Wonder Woman. (DEF.SHORT)
c. I wonder which superhero Amy watched a movie about _____. (IND.LONG)
d. I wonder which superhero Amy watched that movie about _____. (DEF.LONG) = island

The 2x2 factorial design allows us to isolate the effects of DEPENDENCY LENGTH, NP TYPE, and any effect specifically due to the extraction out of the definite object. The effect of DEPENDENCY LENGTH will be indicated by the difference between (8a) and (8c). The effect of NP TYPE will be the difference between (8a) and (8b). For there to be an island effect, the difference between (8c) and (8d) should be larger than the combined effects of NP TYPE and DEPENDENCY LENGTH. The island

effect can thus be quantified with a Difference in Difference (DD) score: $((8b)-(8d))-((8a)-(8c))$.

A positive DD score reflects a super-additive effect which would indicate that a definite DP is an island. A DD score of zero would indicate the complete absence of the island effect. Statistically, a significant interaction between the two factors would indicate the super-additive effect.

In the experiments, the definite objects are headed by the demonstrative *that* and the indefinite objects are headed by the indefinite article *a/an*. The demonstrative *that* was chosen to remain faithful to the examples given in Abeillé et al. (2020) cited from Grosu (1981). In addition, the definite article *the* in English has been argued to be ambiguous between a strong and weak determiner (see e.g. Schwarz 2009), which would potentially affect the locality restriction (Simonenko 2016). The use of demonstrative DPs sidesteps this confound. Following the sentences in Abeillé et al. (2020), the *wh*-elements are complex/D-linked, of the shape *which* + noun. Compared to bare *wh*-elements *what/who*, D-linked/complex *wh*-elements are easier to process (Hofmeister and Sag 2010; Sprouse et al. 2016) thus using them in the experiment let us avoid processing difficulties as a potential confound. The head nouns of the objects are picture nouns as most studies on NP extraction focus on this type of noun. In choosing the main verbs, we avoided verbs of creation like *write* (*a book*) or *take* (*a picture*), as verbs of creation have been observed to obviate island effects of definite NPs. Replacing *watch* in (8d) with *film* in (9) makes extraction acceptable despite the definite NP. See Davies and Dubinsky (2003) and Huang (2022) for discussion.

(9) I wonder which superhero Amy **filmed** that movie about.

All the target items are embedded questions under ‘I wonder’ or ‘I know’ with an equal distribution between the two. Using embedded questions keeps the complexity and length of the items in

Experiment 1 similar to the target items for relative clauses in Experiment 2, as relative clauses are always embedded inside a clause, shown in (10).

(10) I recognized [the journalist who ____ watched a movie about Wonder Woman.]

As P-stranding is the default method of extraction out of these NPs, the long movement conditions always leave the preposition (*about* in (8)) behind, only extracting the DP argument (e.g. *which superhero* in (8c)-(8d)). We investigate Pied Piping/PP movement (whereby the preposition is extracted alongside the DP) as in (11) in Experiments 3 and 4.

(11) **About which** country did Amy watch that movie ____?

16 lexical variants for each condition were constructed. Each participant saw 16 target items, 4 items for each condition, and 32 filler items and 5 attention check items.

3.1.2 Procedure

The experiment used an acceptability judgement task whereby participants were asked to evaluate how well-formed the sentences are on a 7-point Likert scale. 1 was labeled as “completely unacceptable” which participants were told corresponds to a sentence that would never naturally occur in that form, while 7 was labeled “completely acceptable” where there was absolutely nothing wrong about the form of the sentence. Participants were instructed to follow their intuitions, rather than prescriptivist rules they might have encountered. The experiment took less than 15 minutes to complete. The experiment was hosted on PCIBex (Zehr and Schwarz 2018.)

3.1.3 Participants

66 self-reporting native speakers of American English completed the experiment, recruited via Prolific. They were paid 2GBP for their participation.

3.1.4 Predictions

As mentioned above, all existing theories including the structural approach and the FBC constraint predict the definite DP island effect to appear in the LONG+DEFINITE condition in wh-questions (8d).

3.1.5 Results

Mean raw ratings for all the experiments presented in this paper were z-score transformed. Z-score transformation standardises otherwise variant scale usage by different participants. The average z-score and mean raw ratings are shown in Table 1 and plotted in Figure 1. The DD score based on the z-scores $((\text{DEF.SHORT} - \text{DEF.LONG}) - (\text{IND.SHORT} - \text{IND.LONG}))$ is 0.34.

NP TYPE	DEPENDENCY LENGTH	z-score mean	raw judgment mean
indefinite	short	0.85	6.27
indefinite	long	0.45	5.49
definite	short	0.94	6.41
definite	long	0.20	4.99

Table 1: Mean ratings from Experiment 1, n = 66

Z-scored acceptability ratings were modeled using linear mixed effects models with the R packages lme4 (Bates et al. 2015) and lmerTest (Kuznetsova et al. 2017). NP TYPE and DEPENDENCY LENGTH were specified as fixed effects and lexical items and subjects were specified as random effects.³

³The model for Exp1: $\text{z-scores} \sim \text{NP Type} * \text{Dependency Length} + (1 + \text{NP Type} * \text{Dependency Length} | \text{subject}) + (1 + \text{NP Type} * \text{Dependency Length} | \text{lexical})$

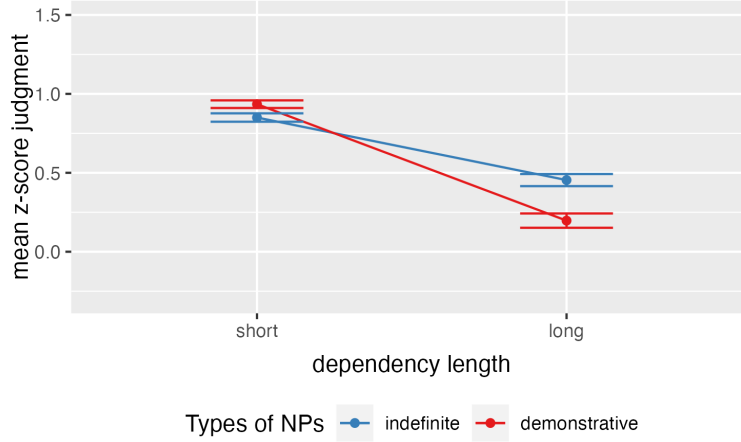


Figure 1: condition means of Experiment 1, $n = 66$

The model revealed a marginal effect of NP TYPE ($\beta = 0.09$, $t = 1.81$, $p = .08$) and a main effect of DEPENDENCY LENGTH ($\beta = -0.40$, $t = -4.85$, $p < .0001$). Crucially there is a significant interaction effect between the two factors ($\beta = -0.34$, $t = -3.44$, $p = .0024$), suggesting a super-additive effect.

3.1.6 Discussion

The observed interaction between the factors indicates that the DEFINITE.LONG condition with movement out of a definite object is penalized beyond the combination of effects of DEPENDENCY LENGTH and NP TYPE. In other words, the definite DP island effect is observed for wh-questions.

The results of Experiment 1 not only confirm that this experiment design can detect the definite DP island effect, but also provide a DD score (0.34) as a baseline of the *size* of this island effect. The DD score of 0.34 observed in Experiment 1 is similar to previous experiments (0.28 in Shen and Lim (2022), 0.22-0.25 in Neal and Dillon (2021)).

3.2 Experiment 2: Definite DP island in relative clauses

3.2.1 Design and materials

Experiment 2 used the same design as Experiment 1, with NP TYPE and DEPENDENCY LENGTH as the factors, but in relative clauses instead of embedded wh-questions. An example of the four conditions is in (12). The relative clauses modify the matrix object in each item. Half of the items use *I recognized* and the other half use *I met* as the main clause subject and verb.

- (12)
- a. I recognized the journalist who ___ watched a movie about Wonder Woman. IND.SHORT
 - b. I recognized the journalist who ___ watched that movie about Wonder Woman. DEF.SHORT
 - c. I recognized the superhero who Amy watched a movie about _____. IND.LONG
 - d. I recognized the superhero who Amy watched that movie about _____. DEF.LONG

3.2.2 Predictions

The FBC analysis predicts that there would be no interaction between NP TYPE and DEPENDENCY LENGTH. Relativisation out of a definite DP should not show any super-additive effects. Unlike wh-movement, relativisation does not involve focus, and non-focus movement out of a backgrounded constituent (the definite NP) should not trigger island effects. Other theories of the definite DP island, including the syntactic approach and the dominance/backgroundedness approach, predict a super-additive effect in relative clauses as specified in Section 2.

3.2.3 Procedure

The procedure of Experiment 2 was identical to Experiment 1.

3.2.4 Participants

64 participants were recruited over Prolific. All participants were self-reported to be native speakers of American English. There was no overlap of participants between Experiments 1 and 2. Participants were all paid 2GBP.

3.2.5 Results

The average z-score and mean raw ratings of Experiment 2 are shown in Table 2 and plotted in Figure 2. The DD score for the z-scores $((\text{DEF.SHORT} - \text{DEF.LONG}) - (\text{IND.SHORT} - \text{IND.LONG}))$ is 0.24.

NP TYPE	DEPENDENCY LENGTH	z-score mean	raw judgment mean
indefinite	short	0.79	5.86
indefinite	long	0.26	4.84
definite	short	0.87	6.01
definite	long	0.10	4.52

Table 2: Mean ratings from Experiment 2, n = 64

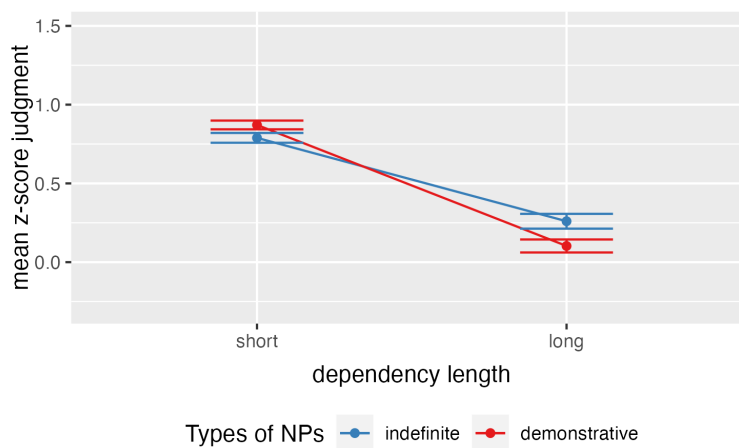


Figure 2: condition means of Experiment 2, n = 64

We constructed linear mixed effect models to predict z-scores, starting with the maximal models and with random slopes removed until convergence. The linear mixed effect model did not

reveal a main effect of NP TYPE ($\beta = 0.07$, $t = 1.25$ $p = .22$) but there is a main effect of DEPENDENCY LENGTH ($\beta = -0.53$, $t = -5.91$, $p < .0001$).⁴ Crucially, we still see an interaction effect between the two factors ($\beta = -0.26$, $t = -3.15$, $p < .001$), indicating that the supraditive effect persists for relativisation.

3.2.6 Discussion

The results from Experiment 2 show that the definite DP island effect is active even in relative clauses where the moved element is not a focus. Empirically, the results are at odds with the informal observations made in Grosu (1981), used in Abeillé et al. (2020). The original observation of a definite DP island effect affecting both wh-questions and relative clauses by Ross (1967) is verified.

Regarding theories of the definite DP island, the results are surprising for the FBC analysis, as it predicts the absence of the island effect in relative clauses. On the other hand, the results are predicted by other theories of the definite DP island, which predict no difference in islandhood between movements with different discourse functions. Our results thus argue against the application of the FBC constraint to definite DP island effects.

Given the presence of the island effect in relative clauses, one could potentially argue for a weaker version of the FBC analysis, namely that the FBC constraint does exist and induces the definite DP island effect in wh-questions, but there is an additional mechanism that gives rise to the definite DP island effect in both wh-questions and relative clauses. The candidates for such an additional mechanism include the ones proposed in the syntactic analyses (PIC, Barriers, etc), or the semantics/pragmatic analyses, as long as this analysis applies to both wh-questions and relative

⁴ $z\text{-scores} \sim \text{NP Type} * \text{Dependency Length} + (1 + \text{NP Type} * \text{Dependency Length} \mid \text{subject}) + (1 + \text{NP Type} * \text{Dependency Length} \mid \text{lexical})$

clauses. Such a hybrid account (FBC + Source 2) would predict the island effect in both relative clauses and wh-questions. In wh-questions, the island effect is driven by both the FBC constraint and the second mechanism. In relative clauses, on the other hand, the island effect results only from the second mechanism as the FBC constraint does not apply. Under this analysis, the size of the island effect is predicted to be smaller in relative clauses than in wh-questions.

We evaluate this possibility by combining the data from Experiments 1 and 2. We ran a post hoc analysis with CONSTRUCTION TYPE (relative clause vs. wh-question) as the third factor, in addition to NP TYPE and DEPENDENCY LENGTH. If the size of the definite island is different between the two constructions, we would expect a significant three way interaction effect between NP TYPE, DEPENDENCY LENGTH, and CONSTRUCTION TYPE.

The model with the three fixed factors shows a main effect of NP TYPE ($\beta = 0.09155$, $t = 2$, $p = 0.046$), and DEPENDENCY LENGTH ($\beta = -0.40$, $t = -5.01$, $p < 0.0001$), but not CONSTRUCTION TYPE ($\beta = -0.05$, $t = -1.16$, $p = 0.25$).⁵ Additionally, we see a two way interaction effect between NP TYPE and DEPENDENCY LENGTH ($\beta = -0.37$, $t = -5.18$, $p < .0001$), but no interaction between NP TYPE and CONSTRUCTION TYPE ($\beta = -0.02$, $t = -0.241$, $p = .81$), or DEPENDENCY LENGTH and CONSTRUCTION TYPE ($\beta = -0.12$, $t = -1.58$, $p = .12$). Crucially, we do not see a significant three-way interaction ($\beta = 0.08$, $t = 0.86$, $p = .41$), which indicates that CONSTRUCTION TYPE does not significantly affect the size of the definite island effect. The weaker hybrid analysis is not supported.

Based on experimental data, no evidence of the FBC constraint driving the definite DP island can be found. This paper thus joins previous work including McInnerney and Sugimoto (2022), Šimík et al. (2022), and Cuneo and Goldberg (2023) in arguing against the FBC constraint as a

⁵The model for the post hoc analysis: $z\text{-scores} \sim \text{NP Type} * \text{Dependency Length} * \text{Construction Type} + (1 + \text{Dependency Length} \mid \text{subject}) + (1 + \text{Dependency Length} \mid \text{lexical})$

locality restriction.

3.3 PP movement and the definite DP island: Experiments 3 & 4

Sentences involving movement out of objects (the LONG conditions) in Experiments 1 and 2 feature P-stranding where only the DP is moved, stranding the preposition, shown in (13).

- (13) a. I wonder **which superhero** Amy watched a/that movie **about** ____.
- b. I recognized the superhero **who** Amy watched a/that movie **about** ____.

Experiments 3 and 4 look into PP movement out of objects and test if a contrast in island effect between wh-questions and relative clauses can be observed in PP movement, shown in (14).

- (14) a. **About which country** did Amy watch a/that movie ____yesterday?
- b. I remember the country **about which** Amy watched a/that movie ____.

Almost all the empirical claims about definite DP islands in English (or extraction out of DPs in general) are built on sentences with P-stranding, as it is the more natural option for English speakers. PP movement out of DPs, on the other hand, is less common and used in a higher register, and is therefore studied less in works on locality constraints. Note that the empirical claim used as evidence for the FBC analysis for definite DP islands in Abeillé et al. (2020) (cited from Grosu 1981) also involves P-stranding and not PP movement (5).

However, it is PP movement out of the subject that provided evidence for FBC's relevance in subject islands in Abeillé et al. 2020. The claim that subject island effects are only present in wh-questions and not in relative clauses is based on materials with PP movement in (15). The subject

island effect is observed as in (15a) and not in (15b).

(15) PP movement

- a. Of which sportscar did [the color ____] delight the baseball player because of its surprising luminance? wh-question (Abeillé et al., 2020, ex. 24a)
- b. The dealer sold a sportscar, of which [the color ____] delighted the baseball player because of its surprising luminance. relative clause (Abeillé et al., 2020, ex. 16a)

Sentences with P-stranding as in (16), on the other hand, showed the subject island effect regardless of the construction type. (Abeillé et al., 2020, p10), citing (Chaves, 2013; Chaves and Dery, 2019, p483), claim that P-stranding differs from PP movement because “the grammatical function of the fronted phrase PP is clearer from the onset than if NP were fronted, given the presence of the preposition: there are fewer potential gap sites that are consistent with the extracted constituent, aiding processing and improving acceptability”. In other words, they suggest that sentences with P-stranding might suffer from a processing difficulty that gives the illusion of a subject island effect while sentences with PP movement do not.

(16) P-stranding

- a. Which sportscar did [the color of ____] delight the baseball player because of its surprising luminance? wh-question (Abeillé et al., 2020, ex. 24b)
- b. The dealer sold a sportscar, which [the color of ____] delighted the baseball player because of its surprising luminance. relative clause (Abeillé et al., 2020, ex. 21a)

Evaluating the source of the difference between PP movement and P-stranding is beyond the scope of this paper. To control for the potential effect of P-stranding claimed by Abeillé et al. (2020), we conducted Experiments 3 and 4 to probe the definite DP island effect in wh-questions and relative clauses with PP movement. This is, to our knowledge, the first experimental study of the definite DP island effect with PP movement. To preview the results, Experiments 3 and 4 show that the definite DP island effect is observed in both wh-questions and relative clauses, even with PP movement. Since Experiments 3 and 4 are identical in design and procedure, we present them together.

3.3.1 Design and materials

Experiments 3 and 4 use the same factorial design as Experiments 1 and 2, with NP TYPE (definite v. indefinite) and DEPENDENCY LENGTH (short v. long) as the two fixed factors. The conditions in both experiments are illustrated in (17) and (18).

(17) Conditions of Experiment 3

- a. Which journalist ___ watched a movie about Finland yesterday? (IND.SHORT)
- b. Which journalist ___ watched that movie about Finland yesterday? (DEF.SHORT)
- c. About which country did Amy watch a movie ___ yesterday? (IND.LONG)
- d. About which country did Amy watch that movie ___ yesterday? (DEF.LONG)

(18) Conditions of Experiment 4

- a. I remember the journalist who ___ watched a movie about Finland. (IND.SHORT)
- b. I remember the journalist who ___ watched that movie about Finland. (DEF.SHORT)

- c. I remember the country about which Amy watched a movie _____. (IND.LONG)
- d. I remember the country about which Amy watched that movie _____. (DEF.LONG)

There are several modifications in the materials from those in Experiments 1 and 2. First, the moved PPs in the LONG conditions have inanimate DP arguments inside them, e.g. ‘about **Finland**’ in (17) and (18), as opposed to ‘about **Wonder Woman**’ in Experiment 1 and 2. An animate DP argument would introduce uncertainty as to whether ‘about who’ or ‘about whom’ would be more appropriate; while both are acceptable, the latter is often dispreferred by some. Using inanimate DP arguments avoids this issue. The moved DPs in the SHORT conditions remain animate given the animate preference for subjects in general. Second, as a result, the main verbs in Experiment 4 have been changed to ‘I remember’ and ‘I know’ which are compatible with both animate and inanimate objects, from ‘I met’ and ‘I recognised’ in Experiments 1 and 2. Third, in Experiment 3, the conditions use matrix wh-questions as opposed to the embedded wh-questions in Experiment 1. We used embedded wh-questions in Experiment 1 to balance the complexity of conditions in Experiment 1 and 2 since relative clauses are always embedded. We made the decision to switch to matrix questions in Experiment 3 to be more similar to the items in Abeillé et al. (2020).

Like previous experiments, 16 lexical combinations were created for each condition. Each participant saw 4 items for each condition, thus 16 test items in total. In addition, each list included 32 filler items and 5 attention check items.

3.3.2 Procedure

The procedure of Experiments 3 and 4 was identical to Experiments 1 and 2.

3.3.3 Participants

Data from 64 participants and 63 participants were included in the analysis for Experiments 3 and 4, respectively. They were recruited via Prolific and paid GBP2 for their participation. All the participants were self-reported native speakers of American English.

3.3.4 Predictions

The predictions for Experiments 3 and 4 are identical to the ones for Experiments 1 and 2 for all theories. The FBC analysis of the definite DP island predicts an island effect in wh-questions but not relative clauses, since the former involves focus movement and the latter does not. Other theories, including the syntactic analyses (PIC/barrier) and other discourse-based analyses (dominance/backgroundedness) predict the island effect to be present in both constructions.

3.3.5 Results

The mean ratings of z-scores and raw judgments for each condition are listed in Tables 3 and 4 and are plotted in Figures 3 and 4. The DD scores $((\text{DEF.SHORT} - \text{DEF.LONG}) - (\text{IND.SHORT} - \text{IND.LONG}))$ are 0.21 for Experiment 3 and 0.2 for Experiment 4.

NP TYPE	DEPENDENCY LENGTH	z-score mean	raw judgment mean
indefinite	short	0.99	6.39
indefinite	long	0.22	4.86
definite	short	0.94	6.32
definite	long	-0.03	4.37

Table 3: Mean ratings from Experiment 3, $n = 64$

We constructed linear mixed effect models for the z-scores. In Experiment 3, we do not see a main effect of NP TYPE ($\beta = -0.04$, $t = -0.86$, $p = .39$), but there is a main effect of DEPENDENCY

NP TYPE	DEPENDENCY LENGTH	z-score mean	raw judgment mean
indefinite	short	0.92	6.26
indefinite	long	-0.12	4.20
definite	short	0.94	6.29
definite	long	-0.30	3.83

Table 4: Mean ratings from Experiment 4, n = 63

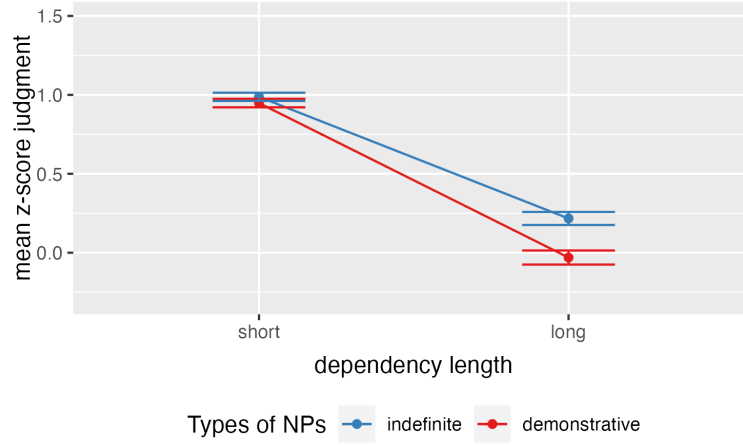


Figure 3: condition means of Experiment 3, n = 64

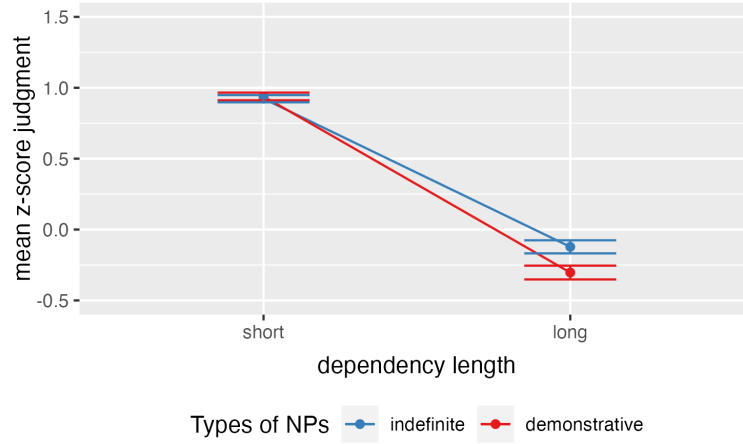


Figure 4: condition means of Experiment 4, n = 63

LENGTH ($\beta = -0.78$, $t = -10.94$, $p < .0001$). Crucially, there is a significant interaction between the two factors ($\beta = -0.19$, $t = -2.57$, $p = 0.0122$).⁶ In Experiment 4, there is no main effect of NP TYPE

⁶ $z\text{-scores} \sim \text{NP Type} * \text{Dependency Length} + (1 + \text{NP Type} * \text{Dependency Length} \mid \text{subject}) + (1 + \text{Dependency Length} \mid \text{lexical})$

($\beta = 0.02$, $t = 0.39$, $p = .7$), but there is a main effect of DEPENDENCY LENGTH ($\beta = -1.04$, $t = -11.58$, $p < .0001$). Crucially, there is a significant interaction effect between the two factors ($\beta = -0.2$, $t = -3.04$, $p = 0.002$).⁷

3.3.6 Discussion

Results from Experiments 3 and 4 show a super-additive effect in both wh-questions and relative clauses, indicating the definite DP island effect in both constructions, even with PP movement. The DD scores were similar (0.21 for wh-questions and 0.2 for relative clauses), indicating that the size of the island effects does not differ either. This goes against the prediction made by the FBC analysis but follows from other theories of definite DP islands.

As with Experiments 1 and 2, we conducted a post hoc analysis using CONSTRUCTION TYPE as the third factor in addition to NP TYPE and DEPENDENCY LENGTH, combining data from Experiments 3 and 4. A weaker version of the FBC analysis would predict a three way interaction, suggesting that the size of the island effect is smaller in relative clauses than in wh-questions as discussed in Section 3.2.6. The model showed no main effects of NP TYPE ($\beta = -0.043$, $t = -0.94$, $p = 0.35$) or CONSTRUCTION TYPE ($\beta = -0.07$, $t = -1.44$, $p = .15$).⁸ There is a main effect of DEPENDENCY LENGTH ($\beta = -0.78$, $t = -9.42$, $p < .0001$). The two way interaction of NP TYPE and DEPENDENCY LENGTH was significant ($\beta = -0.18$, $t = -2.86$, $p = .004$), indicating the definite DP island effect in both constructions. There was also an interaction between DEPENDENCY LENGTH and CONSTRUCTION TYPE ($\beta = -0.26$, $t = -2.81$, $p = .005$): movement out of indefinite and definite objects is more degraded in relative clauses than in wh-questions. The interaction between NP TYPE and CONSTRUCTION TYPE

⁷z-scores \sim NP Type * Dependency Length + (1 + Dependency Length | subject) + (1 + Dependency Length | lexical)

⁸z-scores \sim NP Type * Dependency Length * Construction Type + (1 + Dependency Length | subject) + (1 + Dependency Length | lexical)

was not significant ($\beta = 0.06$, $t = 0.94$, $p = .35$). Crucially, there is no three way interaction of NP TYPE, DEPENDENCY LENGTH, and CONSTRUCTION TYPE ($\beta = -0.016$, $t = -0.18$, $p = 0.86$). Thus the weaker version of the FBC analysis suggested in Section 3.2.6 is not supported as no evidence indicates that the size of the definite DP island effect differs between constructions.

Comparing the same conditions in P-stranding and PP movement, we observe that PP movement out of NP objects is more degraded than sentences with P-stranding, regardless of the definiteness of the objects. As shown in Table 5, in wh-questions (Experiments 1 and 3), both IND.LONG and DEF.LONG conditions with P-stranding are rated 0.23 in z-score higher the same conditions with PP movement; in relative clauses (Experiments 2 and 4), the IND.LONG condition with P-stranding is rated 0.38 higher than the same condition with PP movement and the DEF.LONG condition with P-stranding is rated 0.40 higher than PP movement. These findings confirm that PP movement out of NP object is dispreferred compared to movement with P-stranding. This preference is independent from the definite DP island effect, as it applies to indefinite objects to the same extent.

Dependency Type	Condition	P-stranding	PP movement	Difference
wh-questions	IND.LONG	0.45	0.22	0.23
	DEF.LONG	0.20	-0.03	0.23
relative clauses	IND.LONG	0.26	-0.12	0.38
	DEF.LONG	0.10	-0.30	0.4

Table 5: Comparing z-scores of LONG conditions between P-stranding and PP movement

4 Concluding remarks

Data from four experiments show that the definite DP island effect affects wh-questions as well as relative clauses for both DP movement and PP movement. Neither the presence nor the size of this island effect is affected by the construction type, disputing the empirical claims reported in Abeillé

et al. (2020), following Grosu (1981). Given the distinct discourse functions of *wh*-questions and relative clauses regarding focus, the findings present a challenge for Abeillé et al. (2020)’s recent FBC constraint that predicts that locality restrictions are sensitive to discourse function of the movement. The patterns observed in our experiments, on the other hand, are compatible with other theories of locality in general and analyses of the definite DP island effect in particular. Syntactic analyses from Bowers (1987), Davies and Dubinsky (2003), and Jiménez-Fernández (2012), the semantic analysis from Fiengo and Higginbotham (1981), the hybrid approach of syntactic and semantic analyses from Shen and Huang (2023), and the dominance analysis from Erteschik-Shir and Lappin (1979) all predict definite DP islands to affect all sorts of constructions, as long as movement out of a definite DP is involved.

While this paper argues against the FBC analysis of the definite DP island in particular, it is possible that the FBC constraint is active in other island constructions, including adjunct island and subject island as proposed by Abeillé et al. (2020, 2022). However, it is curious why the effect of the FBC constraint is only observed in these islands, but not in definite DP islands. Another possibility is that the FBC constraint is not what causes subject island effects or adjunct island effects in the first place. While pointing out several problems with the FBC analysis, McInnerney and Sugimoto (2022) attribute the results from Abeillé et al. (2020) where *wh*-questions and relative clauses show different sensitivity to the subject island to a confound. They argue that the ‘extracted PPs’ in the relative clauses (19) could be base-generated topics in the left periphery, similar to (20). If this alternative analysis is on the right track, the absence of subject island effect in (19) is not relevant to the discussion of locality constraints as it does not involve movement at all. The differences between P-stranding and PP movement observed by Abeillé et al. (2020) is also accounted for as the former involves movement out of the subject and the latter does not.

- (19) The dealer sold a sportscar, of which [the color ____] delighted the baseball player because of its surprising luminance. (repeated from (15b))
- (20) Of the stories about Watergate, only yesterday's was truly surprising. (Akmajian and Lehrer 1976, 401, cited from McInnerney and Sugimoto 2022, ex. 27)

Leaving a full evaluation of the FBC constraint for future research, readers are referred to McInnerney and Sugimoto (2022) and Šimík et al. (2022) for other arguments against the FBC analysis for subject islands and adjunct islands.

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