

Testing the Theory of Comprehension and Coreference:
An Auditory Study of English Resumption

A thesis submitted

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Abstract

Resumptive pronouns (RPs) have been suggested to have a number of different functions in English. The most common account proposes that RPs rescue island violations (Ross 1967; Kroch 1981; Shlonsky 1992). Others posit that RPs are devices for improving the acceptability of long distance filler-gap dependencies (Erteschik-Shir 1992; Dickey 1996) or serve as discourse tools related to the type of relative clause in which they appear (Prince 1990). Experimental evidence, however, has shown that English RPs do not ameliorate island violations (Alexopoulou and Keller 2007, Heestand et al. 2011; Han et al. 2012), nor do they significantly improve long distance filler-gap dependencies (Alexopoulou and Keller 2007; Hofmeister and Norcliffe (in press); Han et al. 2012). These findings suggest that RPs may serve as a discourse or pragmatic device.

The primary hypothesis of this thesis is that RPs facilitate the listener's comprehension of the coreferential relationship between the head noun and the gap position. In order to test this hypothesis, this thesis reports the results of two experiments on the acceptability and ease of comprehension of subject RPs with auditory stimuli, one within islands and the other with varying levels of embedding. Given the comprehension facilitation hypothesis, one would expect speakers to process sentences with RPs more accurately and more quickly than those with gaps, but because they create ungrammatical structures, RPs should be rated as equally as bad or worse than gaps. This result should appear with both islands and embedding.

The results of these experiments confirm that English RPs do not improve the acceptability of island violations or deep embedding and show a possible facilitation effect for the accuracy, but not speed, of comprehension. RPs also amnesty ECP violations, which makes sentences with subject RPs within islands more acceptable than their counterparts with gaps. This thesis suggests that RPs do not serve as a rescuing or coreference device for the listener. Instead, as argued by Polinsky et al. (in press) and Clemens et al. (2013), English resumption may be more like cross-sentential anaphora to reinforce the coreferential relationship for the speaker. Alternatively, following Asudeh (2012) and Clemens et al. (2013), RPs may serve to create locally well-formed structures within globally ill-formed sentences. Both explanations suggest that resumption is not a unitary phenomenon and provide evidence for the existence of a speaker-centric model of language production.

1 Introduction

Very generally, a resumptive pronoun is a pronominal that occurs in a subordinate clause where one would normally not expect a pronominal to appear. They often are found in relative clauses, as in (1) and (2):

- (1) Antigua is one of those places that we don't have an extradition treaty with *them* (Morning Edition NPR; from Clemens et al. 2012).
- (2) There are always guests who I am curious about what *they* are going to say (Prince 1990: 482).

RPs can appear both in sentences that are acceptable without the italicized pronominal (1) and in sentences that are unacceptable without the italicized pronominal (2).

English resumption provides an interesting avenue for research because of the disconnect between the theoretical and experimental literatures. The theoretical literature from the 1980s and 1990s largely considers RPs to serve as an acceptability-augmenting device; under these theories, certain structures become more acceptable when they contain RPs. The experimental studies from the late 1990s and 2000s, however, do not support this claim. According to the results of these studies, sentences with RPs are rarely, if ever, more acceptable than their counterparts with gaps, and RPs do not appear to serve as an acceptability-augmenting device. Given this disparity, linguists have not been able to agree on what exactly English resumption is. Additionally, because speakers use RPs, but listeners give them low acceptability ratings, resumption provides an example of the divide between syntax and processing in sentence production and comprehension, and it speaks to the motivations behind choices that speakers make during production.

This thesis serves to provide new experimental evidence about listeners' perception of RPs and to evaluate possible accounts of resumption based on this new evidence. Chapter 2 provides background on English resumption, including a summary of A'-movement,

islands, relative clauses, and intrusive resumption. Chapter 3 discusses the treatment of English resumption in the theoretical literature and then evaluates the merits of those theories based on previous experimental work; this section concludes with the rationale for running the experiments presented in this thesis. Chapter 4 presents the results from Experiment 1, which tests resumption within islands, and discusses their implications. Chapter 5 does the same for Experiment 2, which tests resumption within embedded structures. Chapter 6 provides a general discussion of the results of the two experiments, including an evaluation of the function of resumption with these data in mind, their broader significance for our understanding of language production, and possible directions for future research. Chapter 7 summarizes the results and conclusions of this thesis.

2 Background on Resumption

This chapter provides an introduction to the phenomenon of resumption. It begins with three aspects of theoretical syntax that are necessary for understanding resumption: movement, islands, and relative clauses. I take a closer look at the typology of resumption, emphasizing the distinction originally made by Sells (1984) between true resumption, which occurs in languages like Irish, Hebrew, and Arabic and is rated as fully grammatical by speakers, and intrusive resumption, which occurs in English and other languages as a degraded form.

2.1 Movement, Islands, and Relative Clauses

RPs occur commonly in relative clauses, such as in (3):

- (3) There was one guy [who I didn't think that *he* would come] (Kroch 1981: 127).

Beginning with Ross 1967, many have claimed that RPs rescue islands, structures that prohibit A'-movement, within relative clauses, as in (3) and (4):

- (4) There was one prisoner [that we didn't understand why *he* was even in jail]
(adapted from Kroch 1981: 129).

There are many theories for the formation of relative clauses, most of which argue that relative clauses are derived via movement of the relative head or the base generation of a null operator. Given the importance of movement, islands, and relative clauses for understanding resumption, a brief summary of the syntactic theory of these three phenomena follows.

2.1.1 Movement

The type of movement that is relevant for the discussion of resumption is A'-movement. A'-movement occurs when an element raises from a Case-assigning position to a position that does not assign Case. A common type of A'-movement is wh-movement, which involves the raising of interrogative elements to the specifier of CP, as in (5):

(5) [_{CP} What_i [_{TP} did Mary buy t_i at the store]]?

In (5), the DP *what* originates as the complement of the V⁰ *buy*. In English, however, all interrogative wh-elements, except those in echo questions, must undergo overt A'-movement to [Spec, CP] to satisfy the [+wh] feature on the C⁰.¹ A'-movement is also found in other constructions in English, like topicalization in (6):

(6) [This boy]_i, I found t_i alone at home.

A trace, also known as a gap, is A'-bound by the moved element, and when A'-bound by an operator, the position is referred to as a variable. An A'-moved DP and all of its traces form an A'-chain. In the experimental literature, the connection between an A'-moved DP and its trace is also called a filler-gap dependency or FGD (Haegeman 1994: 393).

The two most prominent movement hypotheses are the copy and trace theories. The copy theory involves two separate operations, the first to copy the element to a higher position and the second to delete the original element. The trace theory involves one operation of transferring an element to a higher position and leaving a trace in the lower position (Takahashi 2010: 1092). Both the copy and trace theories of movement are compatible with the existence of resumption. Those that assume the copy theory of movement suggest that an RP represents the failure of full deletion (McCloskey 2006: 98); those that assume the trace theory of movement suggest that an RP is the spell out of a trace (Kroch 1981: 128; McDaniel and Cowart 1999: B19). The use of the term “gap” in this paper is purely descriptive and does not imply a position on these two competing theories.

¹ A'-movement can also occur covertly, as is hypothesized with wh-in-situ languages like Chinese and Japanese (Haegeman 1994: 496).

2.1.2 Islands

Islands are syntactic structures that prevent the application of A'-movement. The first linguist to identify islands was John R. Ross in his 1967 dissertation, in which he described a number of different structures that restrict A'-movement. One island type is the Complex Noun Phrase Condition (CNPC). The CNPC bans movement out of a complex noun phrase, an NP that takes a CP complement, including relative clauses and factives like *the fact that* and *the claim that*. The following are examples of the CNPC:

- (7) *Who_i did David laugh at the man_i t_i that t_i kicked t_i? (relative clause)
- (8) *What_i did Nora say t_i that the fact that the waitress spilled t_i annoyed her? (*the fact that*)

The second type of island is the Wh-Island Condition (WIC). The WIC prohibits movement out of a wh-complement clause, as in the following:

- (9) *Who_i did Gregory suggest which problem_j t_i solved t_j on the test?

The final island type relevant for our discussion of resumption is the Adjunct Condition (AC). The AC prevents movement beyond the boundaries of an adjunct as in (10):

- (10) *What_i did Michelle tell Daniel that she smiled after buying t_i?

There are a number of different approaches to explaining the unacceptability of extraction from islands. The most prominent are the grammatical and processing explanations.² The first grammatical theories include Chomsky's (1973) Subjacency and Huang's (1982) Condition on Extraction Domain (CED), which propose that A'-movement cannot cross two bounding nodes and cannot emerge from a domain that is not properly

² Although I will not discuss them here, not all grammatical approaches to islands are syntactic in nature. For a well-argued pragmatic explanation, see Goldberg 2007.

governed, respectively.³ Since the early 1990s, the Minimalist Program has attempted to derive Subjacency and CED from even simpler constraints. Adapting Chomsky's (2000) terminology, for example, Nunes and Uriagereka (2000) argue that certain maximal projections, including subject DPs and CPs and adjunct CPs, serve as phases that must be linearized, or spelled out, before undergoing Merge with the rest of the sentence. Extraction can never occur out of such a domain, thus reducing Subjacency and CED to a more general constraint on Move. Stepanov (2010: 80) contends, however, that this analysis is only applicable to adjuncts and relies on barrier-like approach from Takahashi 1994 to exclude extraction from subjects. Whether Subjacency and CED are actual constraints or only generalizations based on other constraints, they are useful ways of distinguishing different types of islands; thus, the use of these terms below is descriptive and does not imply a specific theoretical position.

Other accounts of islands focus on processing effects. Kluender and Kutas (1993: 573) argue that Subjacency is in reality a combination of the processing costs of an FGD held in working memory and of the semantic processing factors of the various elements in the CP and C⁰ position. Phillips (2006) and Sprouse et al. (2012), however, convincingly

³ Under Subjacency, a DP is unable to cross more than one bounding node during one application of movement, with bounding nodes being DPs or TPs (Chomsky 1973). Movement from a complex NP, for example, involves crossing two bounding nodes, as this diagram of (7) shows:

*What_i did [_{TP} David laugh at [_{DP} the man_j t_i that [_{DP} t_j kicked t_i]]]? (CNPC)

Under the Barriers framework, the Subjacency Condition was reworked to prohibit movement across multiple barriers (Chomsky 1986).

Huang (1982: 503-14) proposed the Condition on Extraction Domain (CED) to explain islands that are not covered by Subjacency. CED states that "a phrase A may be extracted out of a domain B only if B is properly governed." Proper government is defined as a relationship between α and β where α governs and c-commands β , and either α is a lexical head (N, V, A, or P), or α and β are coindexed. If α is a lexical head, then the relationship is called lexical government or theta government; if α and β are coindexed, then the relationship is called antecedent government (Haegeman 1994). Because of the rules of minimality, adjuncts CPs cannot be lexically governed or antecedent governed; thus, extraction from an adjunct is prohibited by CED.

reject the assertion that islands are solely the result of processing factors by showing experimentally that the predictions that emerge from such a theory are not borne out; Sprouse et al. (2012: 23), for example, show that the expected correlation between working memory strength and island ratings do not appear.

Finally, some linguists have attempted to bridge the gap between the grammatical and the processing explanations by suggesting that islands have emerged from the grammaticization of processing difficulties. Hawkins (1999: 279), for example, argues that the processing of FGDs aims to fulfill a number of different goals, including minimizing the number of syntactic rules and processing operations, the amount of semantic information, and the distance associated with the FGD. For Hawkins, these processing constraints have become “frozen” in the grammar, and we interpret them as grammatical violations.

As is evident in (7)-(10), the strengths of islands are not all the same; some lead to a higher level of unacceptability than others. Based on this distinction, we can divide islands into two categories: strong islands and weak islands (Kluender 1998: 241). Strong islands incur large acceptability penalties and render sentences incomprehensible. Strong islands include CNP and adjunct islands (Miyagawa 2004: 2). Weak islands incur lower acceptability penalties and render sentences that are still somewhat understandable. Weak islands include the *wh*-islands (Miyagawa 2004: 3). The theoretical differences between strong and weak islands are still under debate; one theory emerges from Chomsky’s (1986) notion of barriers and states that when movement crosses two barriers, it invokes a strong island violation, while crossing one barrier causes a weak island violation (Kluender 1998: 241-2). Additionally, the unity of adjuncts as strong islands is in question. Truswell (2007) argues that different adjuncts form islands of different strengths, specifically related to the semantic relationship between the events in the adjunct and matrix clauses (Truswell 2007: 1374).

Another relevant syntactic theory that does not directly account for islands but does affect the grammaticality of certain structures is the Empty Category Principle (ECP), which prohibits gaps from occupying subject positions next to overt elements in the C^0 or CP positions.⁴ An ECP violation can be added to a Subjacency violation to render a sentence especially unacceptable. Within islands, extraction from the subject position violates both Subjacency/CED and ECP, while extraction from the object position violates only Subjacency/CED. The distinction between and additivity of Subjacency/CED and ECP is important for the discussion of the acceptability of English resumption.

2.1.3 Relative Clauses

RPs often occur in relative clauses, and the experiments described in this thesis test the acceptability of RPs in various structures within relative clauses. It is thus necessary to briefly summarize the competing theories for the derivation of relative clauses.⁵ The following theories and analyses apply to the derivation of relative clauses in English; relative clause formation occurs through a number of different methods cross-linguistically. Because relative clauses can exhibit island effects in English, most theories derive relative clauses via

⁴ ECP uses the same definition of proper government as CED and states that a sentence is ungrammatical if a gap from A'-movement is not properly governed (Chomsky 1981b). The following sentences exemplify the ECP:

- What_i did John think t_i t_i fell off the shelf?
- *What_i did John think t_i that t_i fell off the shelf? (ECP violation)
- ?What_i did John wonder t_i whether Mary brought t_i?
- *What_i did John wonder t_i whether t_i ruined the sauce? (ECP violation)

The first two examples exemplify the *that*-trace effect, whereby a sentence is ungrammatical if an overt complementizer immediately precedes a gap. In the first sentence, the initial gap is lexically governed by the V^0 *think*, but in the second, the presence of the overt complementizer blocks proper government due to minimality. The third and fourth examples exhibit the subject-object asymmetry in which extraction from the subject position is worse than extraction from the object position. In the third, the initial gap is lexically governed by the V^0 , but again, in the fourth, the overt complementizer blocks proper government of the initial gap.

⁵ For a detailed explanation of the theories of relative clauses, see De Vries 2002 and Salzmann 2006.

movement. There are, however, a few non-movement theories, one of which is described below.

The standard analysis of English relative clause formation until the mid-1990s held that relative clauses are formed via A'-movement of the relative pronoun or a null operator to the specifier of the embedded CP. Deemed the Head External Analysis (HEA), this theory has the head NP originate externally to the relative clause, which is adjoined to the NP. In the HEA, the determiner at the onset of the relative clause is higher than the head NP and the relative clause CP. The structure of a relative clause in the HEA is as follows:

(11) the [_{NP} movie;_i] [_{CP} [OP;_i/which;_i] Mary hates t_i]

If the raising element is a null operator and not a relative pronoun, the C⁰ can still have an overt element, as in *the movie that Mary hates* (Salzmann 2006: 5-6). Later versions of the theory had the relative clause CP as a complement of the N⁰ instead of an adjunct to the NP or N' (de Vries 2002: 73).

The second theory for the formation of relative clauses is the Head Raising Analysis (HRA), first suggested by Kayne (1994). The HRA built upon the theory of Smith (1964), who proposed the D-complement hypothesis, that a relative clause is a complement of the D⁰ (de Vries 2002: 74). In the HRA, the external determiner selects a CP complement, and the head NP originates within the relative clause. This NP subsequently undergoes A'-movement to the operator position in the specifier of the CP, and under some theories, to a higher specifier position (Salzmann 2006: 8). The HRA is exemplified in (12):

(12) [_{DP} the [_{CP} movie; [OP/which t_i]; Mary hates t_i]

A third movement theory is the Matching Analysis (MA), a mix of the HEA and the HRA. As in the HEA, the relative clause is an adjunct or complement of the external head NP; as in the HRA, there is an internal NP that raises with the operator/relative pronoun to

the specifier of the embedded CP. This internal NP is deleted under identity with the external head NP, as in the following:

(13) the [_{NP} movie_i [_{OP/which} ~~movie~~_i]; Mary hates t_i]

Despite the application of islands to relative clauses, some believe that relative clauses are not formed via movement. The evidence for this theory comes from languages besides English, many of which do not contain relative pronouns at all. A representative version of the non-movement theory is that of Comrie (1998), who argues that relative clauses in Japanese are formed via gapless adposition, whereby the relative clause serves as a modifier of the head noun with no extraction and thus no gap; the relationship between the head noun and the relative clause is semantic and not syntactic (Comrie 1998: 68). Some non-movement accounts of relative clauses propose a semantic operator that unselectively binds a null pronominal in the position traditionally associated with the gap (Bonneau 1992). For the following discussion of resumption in English, however, I will assume that relative clause formation does involve movement, although I do not take position on the specific theory, as my analysis can fit with any of the movement theories presented above.

2.2 Typology of Resumption

RPs can be divided into two categories based on the acceptability of sentences containing them. This distinction from Chao and Sells 1983 and Sells 1984 separates RPs into true resumptives and intrusive resumptives. True resumptives are RPs that are rated as fully acceptable, can appear productively in the languages that utilize them, and are interpreted as A'-bound variables. Intrusive resumptives are RPs that speakers do not rate as fully acceptable and do not receive an A'-bound interpretation. Because English utilizes intrusive resumption exclusively, this section will only briefly touch upon true resumption.

2.2.1 True Resumption

True resumption encompasses RPs that native speakers rate as fully acceptable. These pronouns can be mandatory or optional, but the structures in which they appear are never rated as degraded. The following is an example of true resumption from Irish:

- (14) an ghirseach ar ghoid na síogaí *i*
the girl C stole the fairies *her*
'the girl who the fairies stole'
(Irish; McCloskey 2006: 95)

All instances of true resumption are subject to strong crossover effects, including in Irish (McCloskey 2006: 100), Hebrew (Shlonksy 1992: 460), and Lebanese Arabic (Aoun et al. 2001: 372).⁶ The presence of strong crossover effects suggests that true resumptives are variables at the end of an A'-chain.

The observation that true resumptives can occur within different syntactic constructions and can have seemingly paradoxical features led the formerly uniform category of true resumption to be divided into two subclasses. Aoun et al. (2001: 732) first noted this in their discussion of RPs in Lebanese Arabic, and it was further explored by Asudeh (2010: 3). The first subclass of true resumption, which Asudeh (2010: 3) calls syntactically active resumptives (SARs), contains RPs that do not appear to be formed via movement. SARs exhibit a number of properties that one would expect from structures that lack movement, including appearing within islands and lacking weak crossover or reconstruction effects (McCloskey 2006: 102; Aoun et al. 2001: 380).⁷ SARs also obey McCloskey's (1990: 102)

⁶ Strong crossover effects involve ungrammaticality when an A'-chain occurs over a coindexed element that c-commands the gap or RP.

⁷ Weak crossover effects are similar to strong crossover effect but occur when the coreferential DP does not c-command the variable (Haegeman 1994: 418). Reconstruction effects involve the application of the binding principles to a moved element as if it were still in its previous movement position (Haegeman 1994: 524).

Highest Subject Restriction (HSR), which states that an RP cannot occupy the subject position immediately following its binder. Other types of RPs often obey the HSR as well, but all SARs do obligatorily. Because they do not involve movement, SARs are thought to be base generated (McCloskey 2006: 104) and to form the A'-dependency via Bind instead of Move (Aoun et al. 2001: 372).⁸

The second type of true resumption, which Asudeh (2010: 3) terms syntactically inactive resumptives (SIRs), includes RPs formed through movement. SIRs show mostly complementary features to those displayed by SARs, occurring within islands and exhibiting weak crossover (McCloskey 2006: 108) and reconstruction effects (Aoun et al. 2001: 381). While some languages with SIRs do follow the HSR, others, like Vata, do not (Asudeh 2010: 9). Some believe that SIRs represent the failure of full deletion under the copy theory of movement (McCloskey 2006: 98). Asudeh rejects this and instead proposes that the difference between SIRs and SARs emerges from the levels at which they are represented, with SIRs removed both in the syntax and at the syntax-semantic interface and SARs removed just in the syntax-semantic interface (Asudeh 2010: 61).

2.2.2 Intrusive Resumption

Intrusive resumption, which Asudeh (2010: 4) calls processor resumption, refers to RPs that do not receive an A'-bound interpretation and are rated as degraded by speakers.

The following are examples of English intrusive resumptives:

⁸ Within Lebanese Arabic, the application of Bind makes sense because SARs only occur within islands, where the Move operation is prohibited. In Irish, however, SARs appear in structures that do not violate island constraints, and it is unclear why these structures would be formed via a more costly operation (Bind) if a less costly strategy (Move) were available. McCloskey (2002: 218), on the other hand, suggests that structures with SARs are formed when the complementizer lacks an *Op* feature that activates Agree and Move, instead initiating Merge with the relative clause. This analysis accounts for the use of SARs in Irish but also leaves us with the puzzling question of why languages ever use movement in the first place (Alexopoulou 2010: 23).

- (15) This is the girl that Bob said that his mother thinks that John is aware of the fact that Peter likes *_{_/?}*her* (Erteschik-Shir 1992: 90)
- (16) We're afraid of things that we don't know what *_{_/?}*they* are (Ferreira and Swets 2005: 1)

Much of the theoretical literature from the 1980s and 1990s assumed that sentences with intrusive resumption are more acceptable than the same structures with gaps. As we shall see below, a number of experiments challenge this assumption, and intrusive resumption is now not considered to produce fully acceptable sentences.

Asudeh (2012: 302) divides intrusive resumption into two subclasses. The first subclass is complexity resumption, which occurs outside of island/ECP violations. The following is an example of complexity resumption:

- (17) This is the girl that Peter said that John thinks that yesterday his mother had some cakes to ?_{_/?}*her* (Erteschik-Shir 1992: 89).

In much of the theoretical literature, complexity resumptives are presented as RPs that become more acceptable with increased distance between the head noun and the pronominal. The approaches of Erteschik-Shir (1992) and Asudeh (2012) both refer to linear distance, but all of their examples rely on embedding. Bennett (2008: 9), however, suggests that complexity resumption is most common in the highest subject position, i.e. the highest specifier of TP in the relative clause. Prince (1990: 482) also provides examples of complexity resumption in this position. In support of the Erteschik-Shir's and Asudeh's claims is experimental evidence that shows that complexity resumptives become more acceptable relative to gaps after two levels of embedding in English (Dickey 1996: 19) and in German and Greek (Alexopoulou and Keller 2007: 18, 21).

Island/ECP resumption, the second subclass of intrusive resumption, includes RPs that some purport to rescue island violations in English, as in Ross 1967, Kroch 1981, and (18):

- (18) I'd like to meet the linguist that Peter knows a psychologist that works with *₋?*her* (Asudeh 2010: 4).

Island/ECP resumptives can occur within any island type, including in *wh*-, CNP, and adjunct islands. This subclass of intrusive resumption is defined in reference to both islands and ECP because such RPs can occur in a position where a gap would constitute an ECP violation in addition to an island violation, as in (19):

- (19) That's the girl that I wonder when *₋/*she* met you (McDaniel and Cowart 1999: B16).

Intrusive resumption appears to be base-generated. Chao and Sells (1983) show that intrusive resumption in English does not receive the A'-bound interpretation that one would expect from movement. As with SARs, intrusive resumptives can occur within islands, which are constraints on movement. Similarly, they do not incur weak crossover effects (McCloskey 2006: 104). Interestingly, intrusive resumptives, at least in English, also do not incur strong crossover effects, as shown by the grammaticality of (20), adapted from an Irish example from McCloskey 2006 (102):

- (20) That's the man_i that the bastard_j said that *he_i* would kill us.

The lack of strong crossover effects provides evidence for a possible explanation for the differences between true and intrusive resumption. Strong crossover effects are constraints on structures with A'-chains. True resumptives, which incur strong crossover effects, are thus thought to be A'-bound variables, whether the dependency is formed via Move for SIRs or via Bind for SARs. Intrusive resumptives, on the other hand, do not incur strong crossover effects, at least not in English, which suggests that they are not A'-bound variables. Instead, they may be related to their antecedent through an anaphoric dependency (Kroch 1981; Chao and Sells 1983; Prince 1990; Erteschik-Shir 1992; Creswell 2002).

2.2.3 Distribution of Resumption Types Across Languages

As is evident from the examples above, languages differ as to which types of resumption they permit. Irish has only SARs (McCloskey 2006: 107). Hebrew has SARs and complexity resumption (Erteschik-Shir 1992). English has intrusive resumption, both complexity and island/ECP types. Swedish exhibits SIRs (Engdahl 1985), as well as complexity resumption (Asudeh 2012: 237).

One controversial aspect of placing the resumptive strategies of these languages into such well-defined categories is the difficulty in determining exactly what counts as resumption in the first place. Aoun et al. (2001: 372), for example, would contend that Lebanese Arabic has both types of true resumption, SARs and SIRs, as shown by the differences in reconstruction effects between structures in islands and those that allow extraction. Malkawi and Guillot (2007: 1), however, argue that in Jordanian Arabic many examples of what they refer to as weak resumption do not exhibit the same patterns, with some RPs within islands showing reconstruction effects and some RPs outside of islands showing no such effects. While this result throws Aoun et al.'s analysis into question, we can also wonder whether the weak resumption that Malkawi and Guillot cite is actually resumption, as they are primarily clitics and not full pronouns. This debate concerning resumption in Arabic implies that the divisions between the types of resumption may not be as well-defined as this chapter suggests.

3 Status and Function of English Resumption

This chapter discusses the phenomenon of resumption as it occurs in English. First, I explore the competing theories of whether English resumption is ungrammatical but somewhat acceptable or grammatical but somewhat unacceptable. Second, I discuss the various hypotheses for the function of resumption in English. Finally, I will examine the validity of these hypotheses using experimental evidence from the literature, showing that English resumption appears to rescue ECP, and not Subjacency, violations and that its relative acceptability improves with increased distance from its antecedent.

3.1 Grammaticality versus Acceptability

A major point of contention concerning English resumption is how to account for the fact that native speakers use RPs in spoken language but do not give structures with RPs high scores in sentence rating tasks. One way to resolve this paradox is by distinguishing between grammaticality and acceptability. I use grammaticality to refer to whether or not a sentence follows the theoretical rules of the language-specific grammar, whereas acceptability refers to whether or not native speakers judge a sentence to be well-formed. The relevant distinction between grammaticality and acceptability is that the latter encompasses the former but also takes into account processing and pragmatic factors. This dichotomy may explain why a speaker would use a structure that does not sound well-formed, but it still leaves us with one question: is English resumption a grammatical form in the syntax but unacceptable because of some processing or pragmatic difficulty, or is it an ungrammatical form in the syntax but acceptable because of processing or pragmatic benefits?

The first to suggest that English RPs are ungrammatical but somewhat acceptable was Kroch (1981: 131), for whom RPs are inserted into the structure during processing to improve the parsability of islands. Erteschik-Shir (1992: 90) also assumes that RPs are not a

syntactic phenomenon because RPs improve with distance, and distance is not a syntactic notion.⁹ Bennett's (2008: 9) discovery that English RPs disobey the HSR and, in fact, occur most commonly in the highest subject position, is one factor that leads him to conclude that resumption falls outside the grammar. A number of other papers on resumption also rely on the assumption that RPs are ungrammatical but somewhat acceptable, including Chao and Sells 1983 and all experimental work, including Dickey 1996, McDaniel and Cowart 1999, Alexopoulou and Keller 2007, and Hofmeister and Norcliffe (in press).

Some linguists do believe, however, that resumption is a part of the grammar of English and attribute its degraded ratings to pragmatic factors. Prince (1990: 485) contends that RPs cannot be a function of processing because they can occur in positions where gaps are fully acceptable. She does not provide any explanation for their degraded ratings.

Creswell (2002) also argues that resumption has to be a feature of the syntax because the Tree Adjoining Grammar model that she assumes only allows for the production of grammatical structures. She provides a number of possible pragmatic explanations for the marginal unacceptability of RPs, ranging from their rarity in comparison to gaps to their use in informal speech (Creswell 2002). Cann et al. (2005) provide what I consider the most reasonable pragmatic explanation for the marginal unacceptability of RPs. They say that English resumption is grammatical but that speakers rate structures with RPs as degraded because they compare them to other simpler structures that convey the same message.

Despite this dichotomy, it is impossible to experimentally separate grammaticality and acceptability (Cann et al. 2005), so there is no way to definitively determine whether English resumption is a syntactic or processing phenomenon. That said, because there do

⁹ As we shall see later, some have tried to define distance syntactically, at least in terms of how it affects English resumption, most notably Dickey (1996). While such attempts have not been completely successful, it does not mean that a syntactic definition of distance is impossible.

not appear to be any instances of fully acceptable structures with RPs in English, and English RPs are anaphoric dependencies and not the expected A'-bound variables, the phenomenon of English resumption seems to emerge as a processing effect and not as a feature of the syntax.

3.2 Functions of Resumption in the Literature

3.2.1 Resumption Rescues Island Violations

The notion that English resumption rescues island violations has its origin in Ross 1967, the same dissertation that introduced the concept of islands. Kroch (1981: 125) contends that resumption rescues island violations involving Subjacency and ECP; RPs serves as a “last resort” that is inserted by the sentence generator when it inadvertently creates a gap position that violates these constraints. Other linguists that advocate the last resort explanation for resumption include Langendoen (1970: 104) and Shlonksy (1992: 443).

Erteschik-Shir (1992) suggests that resumption rescues island violations because an RP can initiate a backward-looking coreferential relationship with the antecedent in a way that a gap cannot after the search for a gap from the antecedent becomes inactive due to the island constraint.¹⁰ Resumption thus allows the coindexation of the antecedent and the gap/RP position, which is vital for semantic interpretation of the sentence.

Creswell (2002) proposes that resumption might be a legitimate strategy within the grammar to produce structures that would violate island constraints if a gap replaced the RP.

While the specifics of her proposal are beyond the scope of this paper, it is interesting to

¹⁰ Her explanation begins with an account of the unacceptability of island violations; she argues that islands cannot be processed because the SEEK order from the filler is never satisfied by a gap, as it must skip island structures, and thus that the filler remains in HOLD at the end of the sentence (terminology from Wanner and Maratsos 1978). She then assumes that pronouns initiate a similar SEEK order for an antecedent that can retrieve a filler from HOLD and that a SEEK order can become inactive with distance. Thus, the processor accepts RPs within islands because the SEEK order from filler is inactive by the time the RP is reached, and the subsequent SEEK order from the RP retrieves the filler from HOLD (Erteschik-Shir 1992).

note that the conception of English resumption as an island-rescuing device can occur within both grammatical and processing frameworks.

3.2.2 Resumption Mitigates Increased Syntactic Complexity

Theories that contend that resumption rescues a wide range of syntactic complexity have their origin in Keenan and Comrie 1977, which presented the Accessibility Hierarchy (AH), an ordered list of the ease of relativization from various syntactic positions. They suggest that the AH also represents the order with which a language will employ the strategy of resumption in relative clauses; thus, if a language uses RPs in one syntactic position, it will also use them in all positions lower on the AH. They attribute the use of resumption to the need to adequately construct a semantic analysis in the face of a syntactically complex structure (Keenan and Comrie 1977: 92). Hawkins (1994: 43-5) explicitly converts the Accessibility Hierarchy into a complexity ranking and claims that speakers use RPs to make complex structures easier to process by preserving the semantic structure. He thus turns Keenan and Comrie's analysis from a semantic account to one based on processing.

Asudeh (2012: 298) argues that resumption is not a "last resort" strategy but is instead a way of creating locally well-formed structures to ease processing, regardless of planning. Overall, the insertion of the RP does not lead to acceptability because the syntax and semantics of the entire sentence do not compute properly; an island with an RP (locally well-formed), however, is better than an island with a gap (completely ill-formed), which explains the insertion of the RP by the processor (Asudeh 2012: 298).

Ariel (1990: 148-155) suggests that a gap always signals lexical dependence with the filler whereas an RP can denote an independent referent outside of the sentence; thus, whenever possible, a gap is preferred to an RP. When the structure increases in complexity, an RP can serve as an anaphora with a dependent meaning and can make the integration of

the complex structure simpler (Ariel 1990). Ariel further reduces all types of resumption to the Accessibility Hypothesis, which states that low accessibility markers (pronouns) indicate NPs of low accessibility and that high accessibility markers (gaps) indicate NPs of high accessibility. She assumes that islands, distance, and positions low on the AH all give NPs at the head of relative clauses low accessibility, which explains the existence of intrusive and true resumption (Ariel 1999).

3.2.3 Resumption Mitigates Distance Penalties

The first to suggest that resumption serves to ease processing difficulties associated with distance was Erteschik-Shir. According to her theory, the SEEK order from the wh-moved NP becomes inactive due to linear distance, which permits the RP's SEEK order to access the antecedent (Erteschik-Shir 1992). Asudeh (2012: 314) provides a similar explanation for complexity resumptives, suggesting that under long distances, the filler becomes deactivated and requires an RP to reactive it to complete the integration of the dependency. The main problem with such theories is that resumption has been attested in the highest subject position (Prince 1990: 482; Bennett 2008: 9; Levy 2011: 2), and it is unlikely that the filler's search for the gap would already be inactive by the highest subject position. However, the improved acceptability of RPs in more embedded structures, which has been found experimentally, provides some validity for this idea.

Dickey (1996: 3-11) argues that the sentence processor can only hold two TPs in working memory at one time, so a gap in a third TP would be unable to find its filler in the first TP. An RP, however, can find its antecedent in discourse, so it does not matter if the TP with the antecedent has been pushed out of working memory.¹¹ This proposal is similar

¹¹ Dickey's Strategic Shunting Hypothesis (SSH) states that the "human sentence processor can protect the syntactic features associated with the nodes of up to two shunting domains against decay" (Dickey 1996). A shunting domain is defined as an infinite or finite TP, and the domain that is

to Erteschik-Shir's and Asudeh's in that distance allows the RP to seek its own antecedent instead of serving as a variable in an A²-chain, although Dickey's is based on embedding and not linear distance. The superiority of Dickey's proposal is that he explicitly defines what constitutes "distance," although his predictions are not borne out by experimental evidence.

Hawkins (2004: 180-90) proposes the Proximity Hypothesis (PH), which states that the linear distance between two elements will be shorter when there are more relations of combination or dependency between them. An FGD has two such relations, lexical co-occurrence and co-indexation. The link between the head NP and an RP has only co-indexation because the RP leads to the abandonment of the forward-looking lexical co-occurrence. Thus, according to the PH, a gap should be closer to the head of the relative clause than an RP (Hawkins 2004). While this is a descriptive account of the distribution of RPs, it suggests that RPs reduce the processing complexity associated with long-distance FGDs, a similar idea to Erteschik-Shir 1992 and Asudeh 2012.

3.2.4 Resumption Serves Discourse Functions

The first theory to reject the processing account in favor of a discourse constraint was that of Prince (1990). In a corpus study of English and Yiddish, she found that RPs are more likely to occur in indefinite restrictive and non-restrictive relative clauses than in

shunted is the one that is the most complete in terms of having all of its constituents and closing any FGDs. Thus, the SSH predicts that in a sentence with a relative clause, memory decay will begin once a second level of embedding has begun and that this decay will target the first shunting domain. With a gap at the bottom of the A²-chain, Dickey suggests that the sentence processor would have difficulty because the antecedent would be in the decaying domain; the substitution of an RP, however, eliminates this problem and restores the acceptability of the sentence since, as a pronoun, the RP is free to find its antecedent in the discourse and does not need to look within the decaying domain (Dickey 1996).

definite restrictive relative clauses.¹² Using Heim's (1983) notion of a "file card," a semantic representation that is created for each new indefinite NP, Prince contends that RPs are acceptable in relative clauses where the relevant file card is created or selected by just the head NP and unacceptable where the file card requires processing the entire relative clause.¹³

Prince's analysis has a number of attractive features. It is immediately apparent why such an explanation would make intuitive sense: it is impossible to use a pronoun to refer to an NP until its file card has been created. Additionally, such an explanation could unify the functions of island/ECP resumptives and complexity resumptives, although neither Prince nor anyone since has evaluated whether this theory holds for RPs within islands.

Cann et al. (2005) argue that RPs become more acceptable when the pragmatic benefits outweigh the cognitive effort required for additional processing. They contend, for example, that resumption is more acceptable with contrastive stress and with emphasized agentivity (Cann et al. 2005: 26-7). These pragmatic factors are thought to operate distinctly from syntax and processing but still may have an effect on acceptability and usage.

3.3 Evaluating the Functions of Resumption: Experimental Evidence

Experimental evidence suggests that English resumption does not rescue Subjacency or CED violations and thus is not a "last resort" used by the sentence processor to improve

¹² A restrictive relative clause narrows focus on a subset of the head NP; a non-restrictive relative clause gives more information about the head NP, whose identity is assumed by the speaker:

The students that do well on the test will please their teacher. (restrictive)

The students, who are lazy, please their teachers by acing the test. (non-restrictive)

¹³ The file card is constructed on the basis of the head NP for all types of indefinite relative clauses, with the non-essential information in the relative clauses added later. Definite non-restrictive relative clauses select a file card based on the head NP and then add the information from the relative clause. Definite restrictive relative clauses, however, cannot select a file card until the entire relative clause is complete. Thus, while definite restrictives rely on the entire relative clause for their file card, all non-restrictive and indefinite restrictives can create or select the file card from only the head NP (Prince 1990: 491-3).

the acceptability of islands. RPs do, however, seem to offset ECP violations, in that islands with both ECP and Subjacency violations become as acceptable as islands with just a Subjacency violation. Finally, experimental studies convey mixed results concerning the effect of distance on resumption, with some showing an improvement in the acceptability of RPs with increased embedding and other showing an acceptability penalty for RPs with embedding, although not as strong a penalty as for gaps. Few, if any, experiments have directly evaluated the general syntactic complexity or pragmatic/discourse theories of resumption, so I will put those to the side.

3.3.1 Resumption Does Not Rescue Subjacency/CED Violations

Despite the widespread consensus in the theoretical literature, a number of experimental studies confirm that resumption does not rescue island violations. Alexopoulou and Keller (2007) provided the first extensive experimental examination of the acceptability of RPs within Subjacency violations. They collected acceptability judgments from native speakers for RPs within *wh*-questions and discovered that RPs were never rated higher than gaps, whether within or outside an island. Additionally, the sentences with RPs were rated significantly lower than those without RPs in the non-island and weak island (WIC) conditions; only within strong islands (CNPC) did the acceptability of RPs match that of gaps, due to a drop in the acceptability of gaps and not a rise in the acceptability of RPs (Alexopoulou and Keller 2007: 14). Because they only examined gaps and RPs in *whether*-islands and *relative clauses* islands and in the object position, these results suggest that resumption does not rescue Subjacency violations. A number of other experimental studies that tested RPs in *relative clauses* support this conclusion, including McDaniel and Cowart 1999 (B21), Omani and Nakao 2010 (12), and Keffala and Goodall 2011 (2).

Heestand et al. (2011) built upon the results of Alexopoulou and Keller 2007 and examined the effects of resumption on both Subjacency and CED-violating island constraints. Heestand et al. 2011 (149) showed that RPs were rated the same as gaps, whether in Subjacency-violating (CNPC) or CED-violating (AC) islands. They also found that participants were quicker to rate the unacceptability of sentences with RPs than with gaps, showing that instead of rescuing the island violation, resumption made it easier to detect the unacceptability of the sentence. Han et al. (2012) tested RPs in the object position in three types of islands (WIC, AC, and CNPC) and came to the same conclusion as Heestand et al., namely that English resumption does not rescue island violations.

3.3.2 Resumption Does Rescue ECP Violations

Although English resumption does not rescue Subjacency or CED violations, it does appear to ameliorate ECP violations within islands. McDaniel and Cowart (1999: B21) found that while there was no difference between gaps and RPs in the object position, wh-islands with subject gaps were rated significantly worse than those with subject RPs, which received comparable ratings to sentences with object gaps or RPs. Thus, their results suggest that English resumption is able to eliminate the effects of an ECP violation, while still maintaining the penalty for the island violation. They say that this result is due to the fact that resumption can rescue violations of representation but not violations of derivation (McDaniel and Cowart 1999: B23); ECP, which is a constraint on the gap after movement, causes a violation of representation, while Subjacency and the CED are both constraints on A'-movement itself and thus cause violations of derivation.

This subject/object asymmetry has been confirmed in Keffala and Goodall 2011 (2) and Han et al. 2012.¹⁴ Han et al., however, reject the conclusion of McDaniel and Cowart that the difference between subject gaps and subject RPs is a property of resumption itself. Instead, they argue that structures with RPs get low ratings not because of the same penalties as gaps but because of a garden-path effect of a reanalysis from a movement interpretation to an anaphoric one (Han et al. 2012). While this theory explains the low ratings of sentences with RPs, it fails to provide a rationale for why sentences with subject RPs within an island are rated as more acceptable than those with gaps. Combining these two theories, with RPs receiving low ratings because of the interpretation reanalysis but at the same time preventing an ECP violation, leaves us with a plausible explanation for the observed data.

Not only does English resumption appear to eliminate the penalty from ECP violations, but speakers also actively produce sentences with resumption in the subject position within islands. Ferreira and Swets (2005) show that, when presented with stimuli that force them into islands, English speakers produce islands with an RP instead of a gap about two-thirds of the time. They also provide evidence that the use of island/ECP resumption is not a “last resort” option, as Kroch (1981: 131) and Creswell 2002 (102) suggest, because speakers are less likely to use a RP in an island when given a time constraint on production (Ferreira and Swets 2005: 9).

¹⁴ It is important to note that Alexopoulou and Keller (2005) found that resumption has no rescuing effect on ECP violations within islands, as sentences with islands were given equally poor ratings with subject gaps as with subject RPs. Additionally, they found that outside of islands, RPs had no rescuing effects on ECP violations (*that*-trace violations), which provides evidence against McDaniel and Cowart’s theory that RPs can ameliorate ECP violations but not those of Subjacency or CED. Because RPs are more common in relative clauses than in the *wh*-questions that they tested, however, these results may not be generalizable.

3.3.3 Distance Affects the Acceptability of Complexity Resumption

Experimental evidence from Dickey 1996, Alexopoulou and Keller 2007, and Hofmeister and Norcliffe (in press) suggests that distance has an effect on the interpretation of English complexity resumption. Alexopoulou and Keller (2007: 14) showed that the acceptability of non-island violating sentences with RPs improved with each level of increased embedding between the antecedent and the RP. In all cases, the acceptability of the sentences with the RP remained below that of the sentences with gaps. The study did not test more than two levels of embedding, however, and it is possible that RPs would be as acceptable as, if not more acceptable than, gaps with increased distance.

Dickey (1996) and Hofmeister and Norcliffe (in press) argue that the processing of RPs is more difficult with increased distance but that this penalty grows smaller with each additional level of embedding. Both studies tested reading times for sentences with gaps and RPs. Reading times for the segments with resumption increased with additional levels of embedding, suggesting that they were harder to process, but the number of milliseconds added to the reading times decreased with each new level of embedding; the addition of a third level of embedding, for example, incurred a smaller increase in reading time than the addition of a second level of embedding (Dickey 1996: 17; Hofmeister and Norcliffe in press). It is possible, however, that the slower reading times are an effect not of resumption but of the complexity of parsing a structure with embedding, an idea that is supported by the fact that additional levels of embedding also incurred longer reading times for gaps (Dickey 1996: 17; Hofmeister and Norcliffe in press). Additionally, Han et al. (2012) present evidence that distance does not affect the acceptability of sentences with RPs, in opposition to Alexopoulou and Keller's findings. If Han et al. were correct, this would suggest that it is the increased distance itself, and not any effect of resumption, that raises reading times.

Despite the disagreement on the nature of the effect of distance on resumption, the effect of distance on gaps is clear. Each additional level of embedding causes sentences with gaps to receive lower acceptability ratings (Alexopoulou and Keller 2007: 14; Han et al. 2012) and to incur an increased reading time penalty (Dickey 1996: 17; Hofmeister and Norcliffe in press). The fact that the improvement, or at least the decreased penalty, of resumption with distance correlates with a decline in the acceptability of gaps suggests that an increased difficulty in processing the FGD with distance may account these observations. Alexopoulou and Keller (2007: 34) present a theory to this effect, proposing that RPs force the abandonment of difficult FGDs in favor of anaphoric dependencies, which are easier to construct with distance (also see Erteschik-Shir 1992; Hawkins 2004; and Asudeh 2012). Regardless of the specific reason that distance improves the acceptability of resumption, Dickey 1996's Strategic Shunting Hypothesis does not properly account for the data.¹⁵

In his corpus analysis of the use of resumption, Bennett (2008) shows that this potential effect of distance on acceptability does not translate to an increased use of RPs in multiply embedded structure. He found that English resumption not only violates McCloskey's Highest Subject Restriction but also occurs most commonly in the highest subject position (Bennett 2008: 9). While Levy (2011: 4) argues that resumption is actually more common in embedded subjects,¹⁶ it is undeniable that resumption does occur in the

¹⁵ His theory suggests that RPs should be worse than gaps with one level of embedding and that gaps should be worse than RPs at two levels. Instead, he finds the reading times for RPs to be uniformly lower than those for gaps. Additionally, Alexopoulou and Keller (2007) and Han et al. (2012) show that the acceptability of RPs either improves with each level of embedding or remains constant across levels of embedding, including the addition of the first embedded clause; Dickey's SSH does not account for either of these results.

¹⁶ Instead of comparing the total number of RPs in the highest subject position versus in an embedded subject position, Levy compares the percentage of highest subject positions with RPs versus the percentage of embedded subject positions with RPs. His analysis shows the opposite of

highest subject position. This finding suggests that the true function of resumption may not be directly associated with distance, although to account for the results described above, it is possible that its function becomes more relevant with distance.

3.4 Rationale for Current Study: Comprehension Facilitation Hypothesis

Despite disagreement about the theoretical nature of resumption, the experimental evidence provides hints about what English RPs are. The fact that they sometimes appear within islands and do not exhibit the usual signs of movement suggests that they are base-generated. The lack of strong crossover effects implies that they are not A'-bound variable. Because there are no examples of entirely acceptable sentences with RPs in English, resumption is likely not a grammatically-sanctioned device but instead emerges during processing, either as a result of syntactic complexity, like islands or distance, or a pragmatic effect, like the type of relative clause. Finally, resumption does not appear to rescue islands and is not a "last resort" for making ungrammatical structures more acceptable.

The experiments presented in this thesis serve two purposes. The first is to confirm in which situations RPs are as or more acceptable than gaps. While speakers generally do not give either sentence very high acceptability ratings in experiments, most in an informal poll would say that they prefer RPs to gaps within islands. It is curious, then, that most controlled experiments have not been able to reproduce this effect. One possibility is that resumption does not in fact rescue island violations. More interesting is the possibility that previous experiments have not been testing this assumption in the correct way. Except for work from Clemens et al. (2013) on object RPs, all experiments have had participants read written stimuli. As any native speaker would confirm, however, all instances of resumption

Bennett's (2008) results, with 0.9% of highest subject positions containing RPs versus 3.3% of embedded subject positions (Levy 2011: 4).

occur in spoken language, so it would make sense to use auditory stimuli to test the acceptability of such structures. Additionally, as shown in McDaniel and Cowart 1999 (B21), Keffala and Goodall 2011 (2), and Han et al. 2012, English RPs appear to have some effect in the subject position but not in the object position. Because of this asymmetry, this thesis presents data solely about subject RPs. The following experiments provide additional evidence for whether or not resumption rescues island violations in English and test RPs in what would appear to be their optimal environment (auditory and in the subject position). This setup will also help to determine exactly what the effect of embedding on the acceptability of resumption is.

The second purpose of this experiment is to test the hypothesis that resumption is a device used by the speaker to facilitate the listener's comprehension of the coreferential relationship between the head noun and the gap position. Under this hypothesis, RPs do not rescue grammatical or processing violations, but they do allow the listener to maintain a chain of coreference within complicated structures. As coreference devices inserted in processing, RPs have an anaphoric, and not A', relationship with their antecedent. Thus, this proposal is similar to those that suggest that an RP acts like a normal pronoun and forms a relationship with its antecedent through a backward search for a coindexed element initiated by the RP and not through a forward search for a A'-bound variable initiated by the antecedent (Chao and Sells 1983; Erteschik-Shir 1992; Dickey 1996; Ariel 1999; Alexopoulou and Keller 2007; Asudeh 2012). The comprehension facilitation hypothesis presented in this thesis, however, builds on the work of Hofmeister and Norcliffe (in press) and Polinsky et al. (in press) in suggesting not only that RPs acquire their meaning through a backward search for an antecedent but also that this coreferential process is their primary function. For Polinsky et al., RPs serve a coreference device purely for the benefit of the speaker; I, like

Hofmeister and Norcliffe, hypothesize that RPs assist the listener in processing this coreferential relationship. Hofmeister and Norcliffe (in press) provide preliminary online reading time data that support this hypothesis by showing that individuals process difficult dependencies more quickly with an RP than with a gap. This study aims to further explore this explanation for English RPs.

The experiments presented here test the comprehension facilitation hypothesis in a number of different structures. Previous experimental results have shown that subject RPs within islands are more acceptable than gaps, and coreferential pronouns are most common as subjects (Frederiksen 1981: 7); thus, all of the sentences tested contain RPs and gaps in the subject position. The need to maintain coreference is heightened in complex structures, including islands and long-distance dependencies, so these experiment test RPs and gaps in both types of sentences. Kehler et al. (2008: 14) show that pronouns within clauses that express a causal relationship with a previous clause are more likely to have an antecedent in the object position; under the comprehension facilitation hypothesis, we might expect RPs to improve comprehension accuracy more within causal adjuncts than within parallel adjuncts since the coreferential relationship with the object NP of the matrix clause, which is the antecedent for the RP in all of the stimuli tested, is stronger for causal structures. The most important dependent variables for testing the comprehension facilitation hypothesis are comprehension question accuracy rates and response times. The former tells us whether RPs assist in understanding the coreferential relationship, and the latter whether RPs speed the processing of the coreferential relationship. I also report acceptability ratings in order to comment on previous studies. Overall, these manipulations and variables allow us to test whether comprehension facilitation is a potential function of English resumption.

4 Experiment 1: Resumption in Islands

Experiment 1 elicits acceptability judgments and measures response times and comprehension accuracy for sentences with subject RPs and gaps within islands. The results demonstrate that subject RPs are more acceptable than subject gaps within islands and that subject RPs assist in accuracy of comprehension. Additionally, RPs improve the acceptability of causal adjuncts more than parallel adjuncts but increase accuracy of comprehension in parallel adjuncts more than causal adjuncts. Overall, the results of Experiment 1 suggest that resumption may play a role in facilitating sentence comprehension.

4.1 Predictions

In light of the results from McDaniel and Cowart (1999) and Han et al. (2012), one would expect a main effect of gap type, such that RPs should be more acceptable than gaps within islands. Assuming a division of strong and weak islands wherein *wh*-islands and at least some adjunct islands in English are weak islands (Miyagawa 2004: 3), and CNP islands are strong islands (Miyagawa 2004: 2), the results should additionally demonstrate a main effect of island type, such that adjunct islands receive ratings similar to *wh*-islands, and both receive higher ratings than CNP islands. The comprehension facilitation hypothesis predicts an interaction between gap type and adjunct island type, such that RPs should be more acceptable than gaps for causal adjuncts but not for parallel adjuncts, as the presence of the RP should assist with the comprehension of the coreferential relationship between the head noun and the gap/RP position within the causal adjunct.

Assuming the comprehension facilitation hypothesis, the results should show a main effect of gap type for response times, such that participants respond more quickly to sentences with RPs than to those with gaps, as RPs should serve to speed the processing of the sentence; alternatively, this same effect could emerge because participants immediately

recognize sentences with RPs as unacceptable (Heestand et al. 2011: 146). With regard to comprehension question accuracy rates, the comprehension facilitation hypothesis predicts a main effect of gap type, such that response accuracy should be higher for sentences with RPs than for those with gaps across all island types because RPs should assist the listener in computing the coreferential relationship between the head noun and the gap/RP position.

4.2 Methods

4.2.1 Materials

The current experiment employed a 2 x 3 design, crossing two factors: gap type (gap vs. RP) and island type (wh-, CNP, or adjunct). Twenty experimental items were created; an example item is given in (21):

(21) *Wh-islands:*

- a. The homeowner paid the interior decorator who Daniel knew which rooms _ redesigned. (gap)
- b. The homeowner paid the interior decorator who Daniel knew which rooms *she* redesigned. (RP)

CNP Islands:

- c. The homeowner paid the interior decorator who the fact that _ redesigned five rooms impressed Daniel. (gap)
- d. The homeowner paid the interior decorator who the fact that *she* redesigned five rooms impressed Daniel. (RP)

(Parallel) Adjunct Islands:

- e. The homeowner paid the interior decorator who Daniel was away while _ redesigned five rooms. (gap)
- f. The homeowner paid the interior decorator who Daniel was away while *she* redesigned five rooms. (RP)

Additionally, half of the items had causal adjuncts, while the other half included parallel adjuncts. (21e-f) represent parallel adjuncts. The following is an example of a causal adjunct pair from the stimuli set:

- (22) *(Causal) Adjunct Islands:*
- a. The CEO fired the employee who the company lost revenue because _ skipped work. (gap)
 - b. The CEO fired the employee who the company lost revenue because *he* skipped work. (RP)

The three island types necessitated certain differences within items: besides the island-creating structure, adjective-phrase adjuncts also differed. All verbs in the most deeply embedded clause were unambiguously transitive to avoid confusion over whether or not there was supposed to be a gap in the immediately preceding subject position. For example, the sentence *The lawyer defended his client who Nora knew which house burned with a match* was changed to *The lawyer defended his client who Nora knew which house set fire to with a match* because the listener could interpret *which house* in the former sentence as the subject of the intransitive verb *burned*, whereas the transitive verb *set fire to* in the latter sentence requires a gapped subject. In creating the items, I ensured that the two NPs in the matrix clause could be interpreted as the same gender, and all NPs in the relative clause were a different number or gender; doing so facilitated a second possible (though incorrect) referent for the gender-specific RP and prevented coindexation of the RP with an NP from within the relative clause. In the sentence *The editor caught the reporter who the public knew that Michelle said he stole the story*, *he* matches the gender of *the editor* and *the reporter* but not *the public* or *Michelle*, so the listener may coindex *he* with either *the editor* or *the reporter* but would not confuse it with a regular pronoun that refers to *the public* or *Michelle*. This manipulation allows us to test whether the addition of an RP assists in the accuracy of comprehension, as the listener could reasonably posit an incorrect referent.

Fillers did not vary across participants. These fillers ranged from completely acceptable to completely unacceptable and included various islands, gender mismatches, and clause types (i.e., interrogative vs. declarative). (23) and (24) are examples of fillers:

- (23) The cowboy that the bulls trampled injured herself getting off a horse.
- (24) Who did the television recruit Anthony because the parents of recommended for the position?

Stimuli were normed using acceptability rating data from ten native speakers of English collected via an online form. Average ratings were computed for each stimulus and each condition. Stimuli that differed by more than 0.5 from the average rating for the respective condition were altered to remove ambiguities or errors that may have affected the ratings. After norming was complete, a male native speaker recorded all of the critical trials and fillers for this experiment (and Experiment 2) in a randomized order. Each sentence was recorded three times and what I deemed to be the most natural recording (in terms of intonation and pauses) was chosen for use in the experiment.

Yes/no comprehension questions appeared with each trial. For the critical items, this question was designed to test the perceived coreferent of the gap or RP; for the fillers, this was a general question about the sentence. Sample comprehension questions for a critical item (25) and for a filler (26) appear below:

(25) *Stimulus:* The homeowner paid the interior decorator who the fact that *she* redesigned five rooms impressed Daniel.

Question: Did the homeowner redesign five rooms? (Answer: No)

(26) *Filler:* The tenants that the landlord despised has been evicted for not paying rent.

Question: Were the tenets evicted? (Answer: Yes)

4.2.2 Participants and Procedure

Data was collected through Mechanical Turk; each participant received \$1.00 for completing the experiment. The task took on average 14.5 minutes. Each participant was

asked for basic demographic information, including sex, native language, and language spoken at home; participants then proceeded to listen to 50 sentences: 20 critical trials (one from each item) and 30 fillers. After each sentence, participants were asked to rate the stimuli on a Likert scale (1-5) based on how acceptable it is in spoken English, with 1 corresponding to “completely unacceptable” and 5 corresponding to “completely acceptable.” Response times were measured from the offset of the sentence to the moment the participant entered a rating. Finally, participants answered a written comprehension question about each sentence with “yes,” “no,” or “unknown.”

One hundred five participants completed the study. Six participants were excluded because they reported that their native or primary language was not English. Another three were excluded because they failed to provide answers for all of the trials. A final six were excluded because they answered the comprehension questions with below 70% accuracy, with the “unknown” responses coded as incorrect. The 70% cutoff was chosen because most of the participants fell between 70% and 90% for comprehension accuracy. These filtering criteria left data from 90 participants to be included in the analyses reported below.

4.3 Results

Figure 1 plots average acceptability ratings for Experiment 1. Error bars represent +/- 1 standard error. I ran a linear mixed effects model with fixed effects for gap type and island type, as well as their interaction, and random intercepts for subject and item, with the island type factor forward-difference coded so that levels could be compared to each other and not just to a global intercept. The model revealed a significant main effect of gap type ($t=8.20$, $p=0.0001$), such that sentences with gaps received a 0.33 higher acceptability rating than sentences with RPs. With gaps, the differences between CNP and wh-islands ($t=1.54$, $p=0.12$) and adjunct and CNP islands ($t=1.59$, $p=0.11$) approached significance, as wh-

islands received a rating 0.11 points higher than CNP islands, and CNP islands received a rating 0.11 higher than adjunct islands. Finally, the interaction between gap type and island type for adjunct and CNP islands was significant ($t=-2.99$, $p<0.01$), such that sentences with CNP islands received higher ratings with gaps and lower ratings with RPs than sentences with adjunct islands.

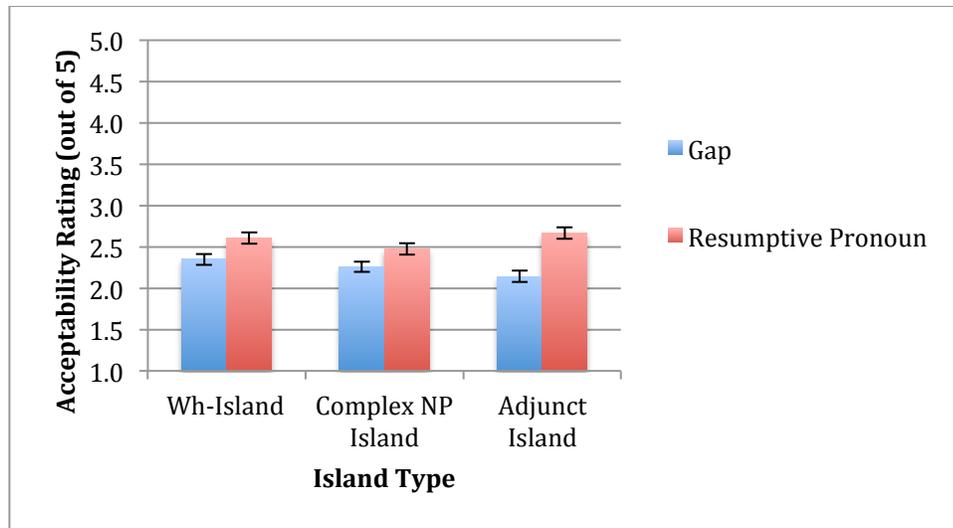


Figure 1: Acceptability Ratings by Island Type

Figure 2 plots average response times by condition. A linear mixed effects model with fixed effects for gap type and island type, as well as their interaction, and random intercepts for subject and item, and with the island type factor forward-difference coded so that levels could be compared to each other and not just to a global intercept, revealed no significant differences between the response times. The differences that approached significance were those between CNP and wh-islands with gaps ($t=1.47$, $p=0.14$) and with RPs ($t=-1.62$, $p=0.11$), such that the sentences with gaps were rated 400 ms faster for CNP islands than for wh-islands and the sentences with RPs were rated 629 ms faster for wh-islands than for CNP islands.

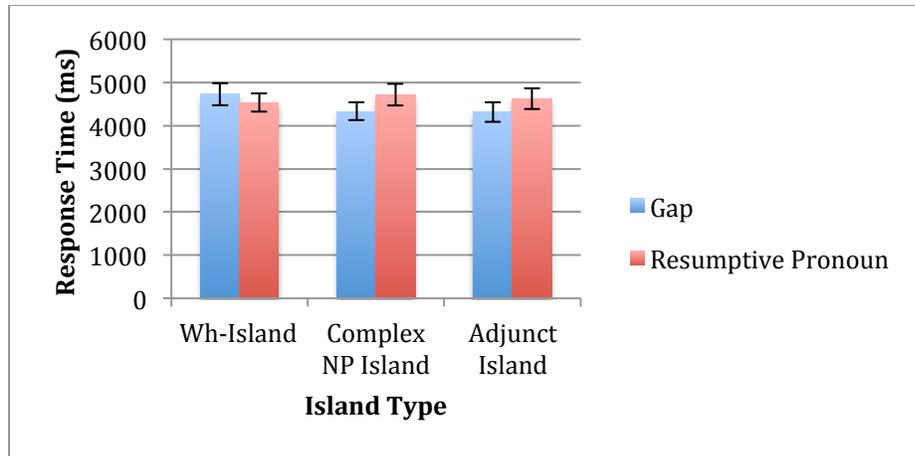


Figure 2: Response Times by Island Type

Average comprehension question accuracy rates are plotted in Figure 3. A linear mixed effects model with fixed effects for gap type and island type, as well as their interaction, and random intercepts for subject and item, and with the island type factor forward-difference coded so that levels could be compared to each other and not just to a global intercept, revealed a main effect of gap type ($t=2.59, p<0.05$). The wh- and adjunct island conditions drove this main effect, which emerged because participants' answers were 5% more accurate in response to questions about sentences with RPs than sentences with gaps. The differences in comprehension accuracy among island types and the interactions between gap type and island type were not significant.

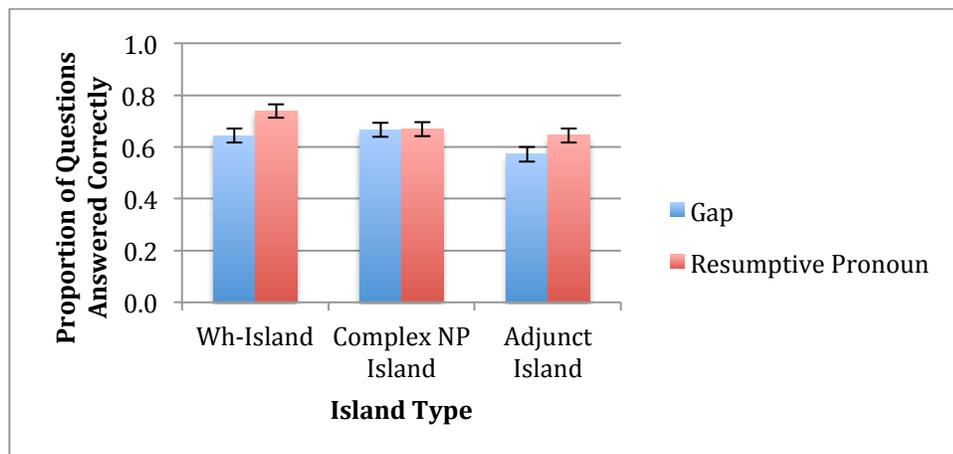


Figure 3: Comprehension Question Accuracy Rates by Island Type

Average acceptability ratings for parallel and causal adjuncts are plotted in Figure 4. A linear mixed effects model with fixed effects for gap type and adjunct type, as well as their interaction, and random intercepts for subject and item revealed a significant main effect of gap type ($t=5.93$, $p<0.001$), with sentences with RPs receiving a rating 0.60 higher than those with gaps. The interaction of gap type and adjunct type approached significance ($t=-1.38$, $p=0.15$) because the causal adjunct condition saw a larger acceptability improvement with the insertion of the RP than the parallel adjunct condition.

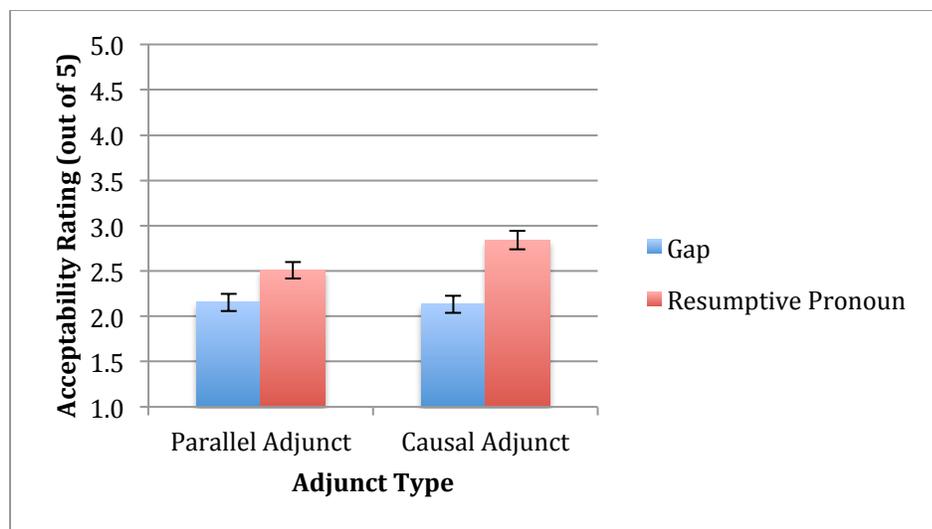


Figure 4: Acceptability Ratings by Adjunct Type

Figure 5 plots average response times for parallel and causal adjuncts. A linear mixed effects model with fixed effects for gap type and adjunct type, as well as their interaction, and random intercepts for subject and item revealed a significant interaction of gap type and adjunct type ($t=2.08$, $p<0.05$). This interaction emerged because participants responded to parallel adjuncts faster with RPs than gaps and in the opposite pattern for causal adjuncts.

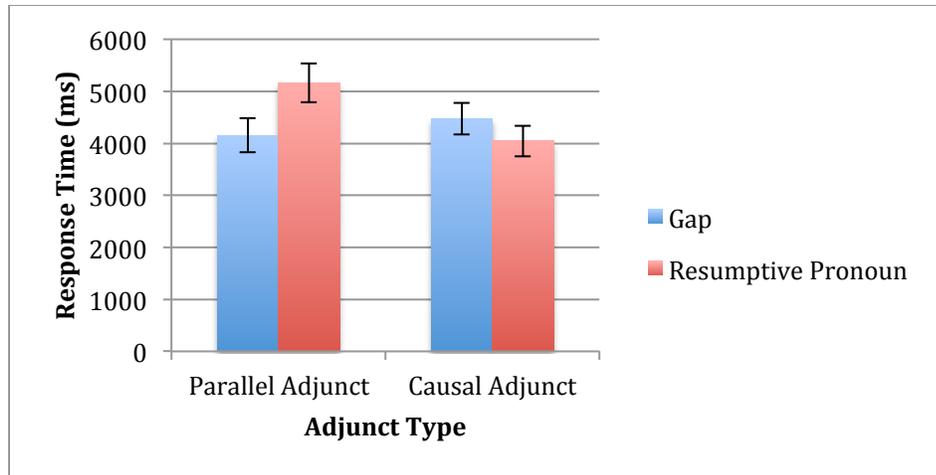


Figure 5: Response Times by Adjunct Type

Average comprehension question accuracies for parallel and causal adjuncts are plotted in Figure 6. A linear mixed effects model with fixed effects for gap type and adjunct type, as well as their interaction, and random intercepts for subject and item revealed a significant interaction between gap type and adjunct type ($t=1.97, p<0.05$). The interaction between gap type and adjunct type emerged because the participants had lower accuracy rates to the questions for sentences with gaps within parallel adjuncts than for all other conditions.

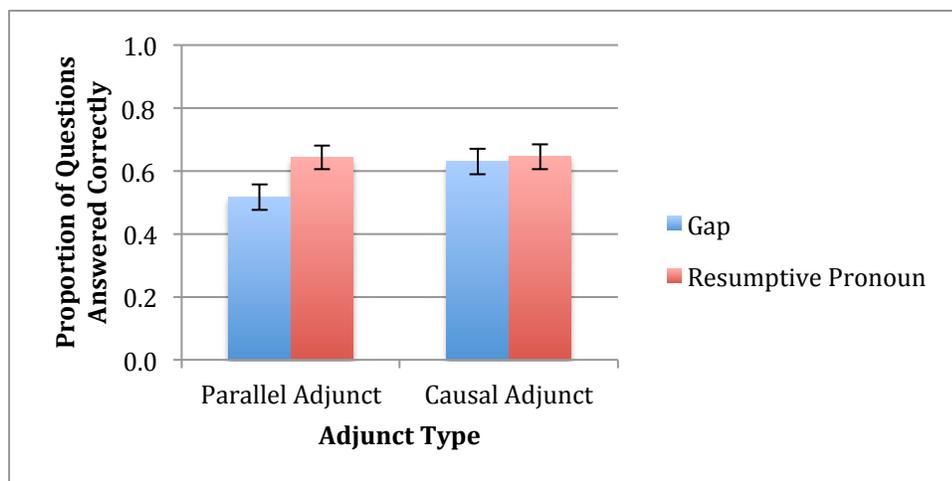


Figure 6: Comprehension Question Accuracy Rates by Adjunct Type

4.4 Discussion

The acceptability ratings for gaps and RPs in Experiment 1 (Figure 1) largely confirm the predictions described above. For all three island types (wh-, CNP, and adjunct), acceptability ratings for RPs were significantly higher than for gaps. McDaniel and Cowart (1999) and Han et al. (2012) report similar results for extraction from the subject position within islands. These results are consistent with an island-rescuing function for resumption. Because the sentences with RPs received an average rating of no more than half a point higher on the five-point Likert scale than their gapped counterparts, however, the experiment shows that RPs do not return islands to full acceptability.

The observed result may also be an ECP-rescuing effect. All of the sentences with gaps violate Chomsky's (1981b) Empty Category Principle because subject gaps are not properly governed due to the intervening CP barrier. RPs do not require proper government, so we may be observing an ECP-rescuing effect instead of an island-rescuing effect. The results could also be consistent with the comprehension facilitation hypothesis. A number of different factors affect the acceptability rating of a sentence, including grammaticality and processing difficulty. The comprehension facilitation hypothesis predicts that English RPs, unlike RPs in languages with true resumption, do not make the sentence grammatical or fully acceptable; that said, the facilitation of the processing of the connection between the head noun and the gap position by the RP may positively affect participants' acceptability judgments, such that RPs receive higher ratings than gaps because the processing of the anaphoric dependency is simpler than computing the FGD.

The response time data (Figure 2) provide evidence against the comprehension facilitation hypothesis. Instead of being processed more quickly by the listener, the sentences with RPs had longer response times than those with gaps. This result also opposes the

reported effect from Heestand et al. 2011, which found that response times for sentences with RPs were significantly shorter than those for sentences with gaps or for the control sentences. Heestand et al. argue that participants were able to identify the unacceptability of RPs more quickly than the unacceptability of gaps (Heestand et al. 2011: 146). The results of Experiment 1 oppose this interpretation in two ways. First, subject RPs were less unacceptable than subject gaps. Second, the response times for all conditions, regardless of gap type or island type, were roughly equivalent. Participants thus judged sentences with RPs to be more acceptable than those with gaps in the same amount of time. This subject/object (Experiment 1/Heestand et al. 2011) asymmetry may emerge because of an ECP-rescuing effect. In the subject position, the RP and its ECP-rescuing effect somewhat offset the acceptability penalty induced by the island, which forces the speaker to take longer to judge the sentence; in the object position, the RP serves no such purpose and makes it easier for the listener to identify the sentence as unacceptable.

The comprehension question accuracy rates (Figure 3) provide support for the comprehension facilitation hypothesis. As predicted by this hypothesis, participants responded more accurately to questions about sentences with RPs than to those with gaps. This difference is driven by the adjunct and wh-island conditions, while we observe no difference in accuracy rates for CNP islands. Given the inconsistency within the CNP island condition, we cannot take the current results as evidence fully in favor of the comprehension facilitation hypothesis, but, crucially, these results do suggest that RPs may have some comprehension facilitating function.

The results from the adjunct type analysis provide mixed evidence regarding the comprehension facilitation hypothesis. On the one hand, accepting the idea that the comprehension facilitation function could have an indirect effect on acceptability judgments,

the ratings in Figure 4 fit with what one would expect given this theory. As discussed above, the coreferential link with a higher object NP is stronger for the subject of a causal adjunct than for the subject of a parallel adjunct; if resumption serves as a comprehension facilitation device, then it should ease comprehension more for causal adjuncts than for parallel adjuncts because all of the stimuli have an antecedent in the object position. On the other hand, the comprehension accuracy rates (Figure 6) do not align with the comprehension facilitation hypothesis. The accuracy rates should improve with the addition of an RP in both adjunct conditions, with a larger effect for causal adjuncts; the data shows not only that the improvement in accuracy from the gap to the RP condition is lower for causal adjuncts than for parallel adjuncts, but also that there is no difference at all between the two conditions for causal adjuncts. Interpreted differently, this result may still fit with the comprehension facilitation hypothesis. It is possible that the stronger coreferential relationship with the causal adjunct meant that the listener did not need the RP to comprehend the sentence properly, which explains why there was no difference in accuracy rates within the causal adjunct condition; with parallel adjuncts, the listener does need the comprehension facilitation that the RP provides, which explains the improvement in accuracy between the two conditions. It is impossible, however, to accept both that improved comprehension leads to higher acceptability judgment increases for causal adjuncts than for parallel adjuncts and that improved comprehension accuracy occurred for parallel adjuncts but not for causal adjuncts; this makes this analysis inconclusive.

A final important result concerns the acceptability ratings for adjunct islands. The theoretical literature emerging from Ross 1967 has categorized adjuncts with complex NPs as strong islands, structures from which extraction incurs a large acceptability penalty. Heestand et al.'s (2011: 148) results, however, showed that sentences with extraction in a

relative clause from within a *while* or *although*-adjunct island were rated only slightly lower than grammatical controls. The authors then suggest that the broad category of “adjunct island” comprises a number of specific structures that incur varying acceptability penalties and that *while* and *although*-islands are two structures that create very weak islands (149). The results presented here contradict Heestand et al.’s claim, at least for *while*-islands. In this study, all of the parallel adjuncts contained *while*-islands, and participants rated them to be as unacceptable as *wh*-, CNPC, or causal (*because*) islands, if not more unacceptable (Figures 1 and 4). There are two possible reasons for this divergence. First, this thesis and Heestand et al. 2011 considered RPs in different structural positions, the former as subjects and the latter as objects. Second, Heestand et al. 2011 placed the adjunct CP before the embedded TP, while this thesis tested sentences with adjuncts at the end of the embedded clause; if we accept that the increased difficulty in computing a longer FGD may lead to increased unacceptability, then the fact that the adjunct-island sentences in this study contained a linearly longer FGD than those in Heestand et al. 2011 may explain the lower ratings for *while*-adjuncts reported here. A follow-up study with gaps in multiple positions within adjunct islands is necessary to confirm these results and test these explanations.

In summary, the current results show that subject RPs within islands are more acceptable than subject gaps because of either an island-rescuing or ECP-rescuing effect. Response times for sentences with gaps and RPs are not significantly different, which provides evidence against the comprehension facilitation hypothesis, a theory that predicts lower processing times for RPs. On the other hand, participants responded more accurately to questions about the coreferential relationship in sentences with RPs than in those with gaps, which suggests that RPs may play a comprehension facilitation function. Finally, causal adjuncts saw a larger increase in acceptability with RPs over gaps than parallel adjuncts, but

the accuracy rates in response to questions about sentences with parallel adjuncts improved more than those for causal adjuncts, which provides contradictory evidence with regard to the comprehension facilitation theory.

5 Experiment 2: Resumption in Embedded Structures

Experiment 2 elicits acceptability judgments and measures response times and comprehension accuracy for sentences with subject RPs and gaps in various levels of embedding. The results demonstrate that subject RPs are never more acceptable than subject gaps outside of islands and that RPs outside of islands do not facilitate speed or accuracy of comprehension.

5.1 Predictions

Assuming that the sentences with gaps are considered to be standard forms in the grammar and those with RPs are not, one would expect to find a main effect of gap type for acceptability ratings, such that gaps are rated as more acceptable than RPs in all embedding conditions. Assuming that the computation of FGDs incurs higher processing costs with increased distance (Erteschik-Shir 1992; Alexopoulou and Keller 2007; Hofmeister and Norcliffe in press), the results should also demonstrate a main effect of level of embedding, such that all sentences will become less acceptable with increased levels of embedding, as this processing difficulty should reduce acceptability ratings. These main effects also fit with the comprehension facilitation hypothesis because the acceptability of RPs will crucially not improve with increased embedding, nor will RPs ever be rated more acceptable than gaps. Finally, if the processing costs of a long-distance FGD are higher than those of a long-distance anaphoric dependency (Hawkins 2004), one would expect an interaction between gap type and level of embedding such that embedding decreases the acceptability of sentences with gaps more than that of sentences with RPs.

Assuming the comprehension facilitation hypothesis, the results should show a main effect of gap type for response times, such that sentences with RPs are rated faster than

those with gaps. As in Experiment 1, if the purpose of an RP is to ease the processing of the FGD, then response times may be faster with RPs than with gaps.

The comprehension facilitation hypothesis also predicts an interaction between gap type and level of embedding for comprehension question accuracy rates, such that the accuracy rates decrease with embedding for the gap condition but increase with embedding for the RP condition. The coreferential relationship between the head noun and the gap is more difficult to process with longer FGDs, so if the purpose of the RP is to facilitate the listener's comprehension of coreference, then the use of an RP should lead to greater comprehension accuracy where FGDs are difficult to process but not where FGDs are more simple to process.

5.2 Methods

The methods used in Experiment 2 are similar to those used in Experiment 1.

5.2.1 Materials

The current experiment employed 2 x 3 design, crossing two factors: gap type (gap vs. RP) and level of embedding (zero, one, or two). Because all of the stimuli contain one level of embedding (the relative clause), I ignore this initial level when describing the conditions, and this second factor refers to the number of embedding levels within the relative clause. Twenty experimental items were created, modeled on the items used in Experiment 1. An example item is given in (27):

- (27) *Zero Embedding*
- a. The actor praised the writer who _ developed the script for the award-winning movie in the past year. (gap)
 - b. The actor praised the writer who *he* developed the script for the award-winning movie in the past year. (RP)

One Level of Embedding:

- c. The actor praised the writer who Lauren found out *_* wrote the script for the award-winning movie. (gap)
- d. The actor praised the writer who Lauren found out *he* wrote the script for the award-winning movie. (RP)

Two Levels of Embedding:

- e. The actor praised the writer who the critics reported that Lauren found out *_* wrote the script for the movie. (gap)
- f. The actor praised the writer who the critics reported that Lauren found out *he* wrote the script for the movie. (RP)

As in Experiment 1, ambitransitives were avoided, and gender matching was monitored. Ten individuals provided norming data for the stimuli through an online survey, and I followed a similar procedure to Experiment 1 to remove unintended ambiguities. The fillers were the same as those used in the first experiment, but the fillers containing interrogatives were replaced because none of the critical trials in Experiment 2 contained indirect questions. The fillers varied in acceptability and in structure to provide adequate distraction from the experimental manipulations.

5.2.2 Participants and Procedure

Participants were paid \$1.00 to complete the experiment on Mechanical Turk, where they rated 50 sentences (20 critical trials and 30 fillers) and answered one question about each sentence. Participants took an average of 16.85 minutes to complete the experiment. One hundred individuals completed the study; five were excluded because they reported that their native or primary language was not English. Another four participants were excluded because they failed to provide answers for all of the trials. A final four were excluded because they answered the follow-up questions with below 70% accuracy. This left data from 87 participants to be included in the analyses reported below.

5.3 Results

Average acceptability ratings for Experiment 2 are plotted in Figure 7. A linear mixed effects model with fixed effects for gap type and level of embedding, as well as their interaction, and random intercepts for subject and item revealed the following effects. There was a significant main effect of gap type ($\chi^2(2)=279.50$, $p<0.001$), as sentences with gaps received a rating 1.85 higher than their counterparts with RPs with the same level of embedding. There was also a significant main effect of level of embedding ($\chi^2(2)=259.95$, $p<0.001$); controlling for gap type, each additional level of embedding decreased ratings by 0.94. Finally, there was a significant interaction between gap type and level of embedding ($\chi^2(1)=219.80$, $p<0.001$), as the acceptability penalty from embedding was stronger for gaps than RPs.

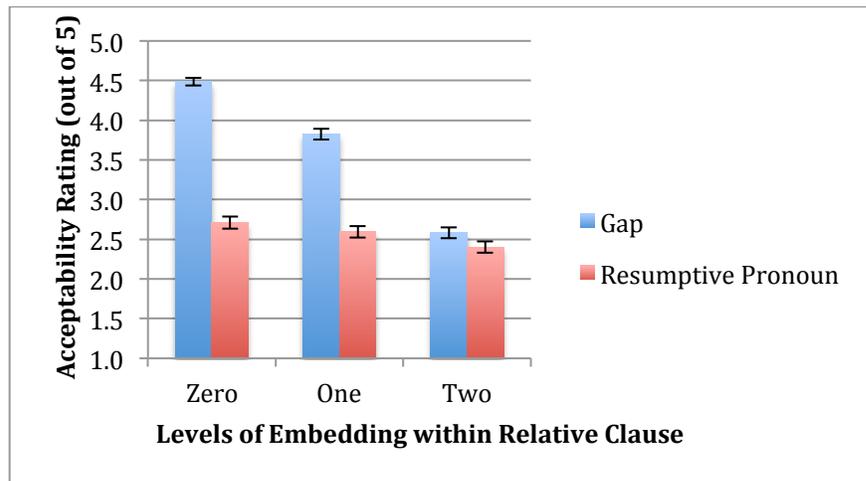


Figure 7: Acceptability Ratings by Level of Embedding

Figure 8 plots response times. A linear mixed effects model with fixed effects for gap type and level of embedding, as well as their interaction, and random intercepts for subject and item revealed a significant main effect of level of embedding ($\chi^2(2)=56.17$, $p<0.001$), such that response times increased by 382.3 ms with each additional level of embedding. The main effect of gap type ($\chi^2(2)=20.33$, $p=0.21$) and the interaction between gap type and level

of embedding ($\chi^2(1)=5.19, p=0.82$) were not significant; within each level of embedding, the response times for the sentences with gaps and those with RPs were similar.

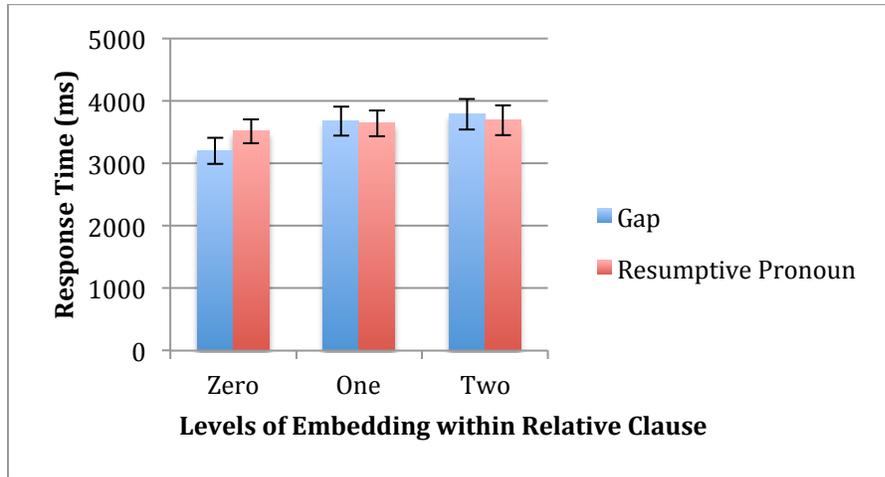


Figure 8: Response Times by Level of Embedding

Comprehension question accuracy rates are plotted in Figure 9. A linear mixed effects model with fixed effects for gap type and level of embedding, as well as their interaction, and random intercepts for subject and item revealed a main effect of level of embedding ($\chi^2(2)=29.50, p<0.001$). This effect emerged because each additional level of embedding led to a 0.12 lower accuracy rate both for the sentences with gaps and for those with RPs. There was no significant effect of gap type ($\chi^2(2)=1.61, p=0.45$) despite the clear trend and no significant interaction between gap type and embedding ($\chi^2(1)=0, p=1$).

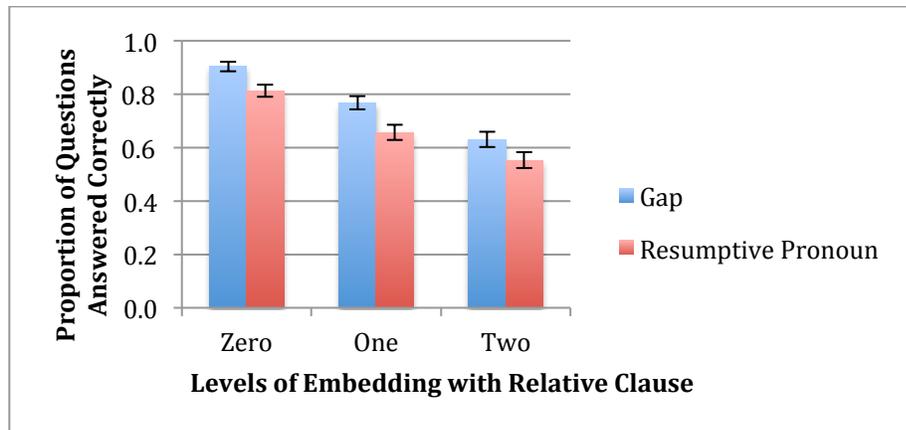


Figure 9: Comprehension Question Accuracy Rates by Level of Embedding

5.4 Discussion

The acceptability ratings from Experiment 2 (Figure 7) replicate previous experimental findings and fit with the predictions from the comprehension facilitation hypothesis. As anticipated, RPs are always less acceptable than gaps, regardless of the number of levels of embedding within the relative clause. While gaps become less acceptable with increased levels of embedding, they never receive ratings lower than RPs. This result provides evidence that RPs do not serve as a rescuing device for long-distance FGDs, at least not in terms of acceptability.

Additionally, the main effect of embedding is in line with previous experimental work that has shown that sentences with longer FGDs receive lower acceptability ratings, including Alexopoulou and Keller 2007 and Han et al. 2012. The fact that this distance penalty occurs gradually with each additional level of embedding provides evidence against Dickey's Strategic Shunting Hypothesis, which posits that this penalty would only come into effect with the second level of embedding within the relative clause, and in favor of an account that assumes that the processing of FGDs becomes more difficult incrementally, in line with the reasoning in Erteschik-Shir's (1992) theory. This decrease in acceptability with increased levels of embedding also suggests the existence of a processing difficulty that occurs in long-distance FGDs that the insertion of an RP may correct, which is a premise of the comprehension facilitation hypothesis. Acceptability encompasses a number of different factors, most importantly grammaticality and processing difficulty, and grammatical sentences with long-distance FGDs may receive lower acceptability ratings because participants find sentences that are more difficult to process less acceptable. The processing difficulty in question in long-distance FGDs could be associated with computing the coreferential relationship between the filler and the gap. The insertion of an RP may serve to

facilitate comprehension of the coreferential relationship, but because the structure is non-standard, the listener may rate RPs as worse than gaps.

The interaction between gap type and level of embedding suggests that the processing difficulty that occurs with increased embedding in sentences with gaps does not affect sentences with RPs. Because the sentences with RPs were always rated as worse than those with gaps, the presence of the RP likely does not solve the processing difficulty; if it did, then participants would rate RPs as more acceptable than gaps in deep embedding situations. It is possible, however, that this experiment did not test enough levels of embedding and that RPs would surpass gaps at three or four levels of embedding within the relative clause. This interaction fits with the comprehension facilitation hypothesis because distance would increase the difficulty in computing the coreferential relationship more for sentences with gaps than those with RPs if we assume a theory of dependencies like Erteschik-Shir (1992), Alexopoulou and Keller (2007), and Asudeh (2012). With an FGD, the parser must keep the filler in working memory until it reaches the gap; this can become more difficult with increased distance (Hawkins 1999: 251, Gibson 2000: 102). An anaphoric dependency with an RP only necessitates the computation of a coreferential connection to a previously mentioned NP, which does not require working memory and is simple over a long distance. Thus, the rapid decrease in ratings that accompanies increased levels of embedding for gaps suggests that the grammatical function of the filler in a gap sentence is fundamentally different from that of a filler in an RP sentence: only in the former must we maintain a syntactic dependency, the cost of which drastically increases with distance. With RPs, no such dependency must be maintained; instead, the filler is linked to the pronoun only on the basis of shared reference. That the effect of embedding still holds for RPs, albeit

to a much lesser extent than it does for gaps, suggests that sentences with RPs receive some penalty from the initiation of the FGD before the anaphoric relationship is established.

Just as in Experiment 1, response times (Figure 8) do not support the comprehension facilitation hypothesis, as the presence of RPs does not result in faster processing times for listeners. Again, the data are in conflict with Heestand et al. 2011's finding that individuals rate sentences with RPs more quickly than those with gaps. This study shows no effect of gap type, with participants rating sentences with RPs in the same amount of time as they rate those with gaps. The significant effect of level of embedding likely emerges from the increased complexity of the sentences with one and two levels of embedding; with additional levels of embedding, the listener has more words and clauses to process and a longer FGD, which may force him or her to take more time to produce acceptability judgments.

Participants' accuracy rates for the comprehension questions (Figure 9) also provide evidence against the comprehension facilitation hypothesis. If the function of the RP is to help maintain a coreferential relationship between the filler and the gap, then participants should respond more accurately to the questions that explicitly test the listener's understanding of that relationship when the sentence contains an RP than when the same position is occupied by a gap. In fact, at no level of embedding do participants respond more accurately to the questions about the sentences with RPs than to those about the sentences with gaps. With one or two levels of embedding within the relative clause, which is where the coreferential relationship should be more difficult to process and thus where we would expect an RP to help with the computing of the meaning of the sentence, participants still respond less accurately when the sentence contains an RP. This suggests that not only do

RPs not assist the listener in understanding the meaning of the sentence, but they even hinder comprehension.

In summary, the current results show that RPs are always less acceptable than gaps outside of islands and that increased levels of embedding decrease the ratings for sentences with gaps more than for sentences with RPs. Additionally, sentences with RPs are processed as slowly as sentences with gaps, and listeners respond less accurately to questions testing the coreferential relationship between an RP and its antecedent than between a gap and its antecedent. While the acceptability judgments could be interpreted to fit with the comprehension facilitation hypothesis, as the method of computing the coreferential relationship may explain the different effects of embedding on gaps and RPs, the response times and accuracy rates suggest that resumption does not serve as a comprehension facilitation device.

6 General Discussion

6.1 Reevaluation of the Function of English Resumption

The two experiments presented here allow us to further assess the functions of English resumption proposed in the theoretical and experimental literature. First, the results of Experiment 1 confirm the conclusion of McDaniel and Cowart (1999) and Han et al. (2012) that subject RPs within islands are more acceptable than subject gaps. This result likely reflects a rescuing effect for Empty Category Principle violations. The ECP is a constraint on the position of a gap, so when an RP replaces the gap, the sentence should no longer incur the ECP violation penalty. This ECP-rescuing effect, however, is a not unique property of resumption; any other element in the same position would also save the ECP violation. Additionally, RPs are reported in many positions where gaps do not violate the ECP. Thus, while resumption does appear to rescue ECP violations, this is likely a consequence of its use and not its primary motivation.

Because the stimuli tested in these experiments contained only subject gaps and RPs, it is impossible to determine conclusively that English resumption does not have an island-rescuing effect instead of or in addition to its ECP-rescuing capabilities. Other studies that found resumption in the object position within islands to be as unacceptable as gaps (McDaniel and Cowart 1999; Alexopoulou and Keller 2007; Heestand et al. 2011; Han et al. 2012) make a general island-rescuing effect unlikely, as well as the fact that the acceptability ratings for RPs remained well below the midpoint of the Likert scale for all island types. Experiment 1 thus provides further evidence against the idea prevalent in the theoretical literature that resumption rescues islands.

The results of Experiment 2 confirm that resumption does not ameliorate acceptability penalties associated with the processing of deeply embedded FGDs. As in

Alexopoulou and Keller 2007 and Han et al. 2012, RPs were consistently rated as worse than gaps, whether with zero, one, or two levels of embedding within the relative clause; the interaction between gap type and level of embedding revealed that gaps received a larger acceptability penalty with each additional level of embedding than RPs did, but RPs remained worse in all conditions tested. Two qualifications about these results for the distance theory of resumption are important to note. First, like previous studies, Experiment 2 did not test sentences with more than two levels of embedding within the relative clause; it is possible that RPs would become more acceptable than gaps in sentences with three or four levels of embedding, although we would likely see a floor effect. Second, Experiment 2 tested embedding and not linear distance; resumption still may serve to repair processing costs associated with linear distance in the absence of embedding. These results, however, do not fit with the distance theory for the function of resumption.

The two experiments presented in this study do not speak directly to Hawkins' theory that RPs serve to mitigate general syntactic complexity. Within syntactically complex islands, RPs received higher ratings than gaps, but this difference was likely due to an ECP-rescuing effect and not a rescuing of the island violation, as argued above. RPs received lower ratings than gaps in deep embedding, which Hawkins also considers a syntactically complex structure; these results thus does not fit with his theory. His claim that RPs should be more acceptable in positions low on the Accessibility Hierarchy was not tested in these experiments, as all gaps and RPs were in the subject position, the highest point on the hierarchy. As far as I am aware, no study has examined the acceptability of RPs in positions low on the Accessibility Hierarchy, like obliques and objects of comparatives, and this would be a fruitful area for future investigation.

One of the main motivations of this thesis was to explore the comprehension facilitation hypothesis of resumption, that RPs serve to ease the listener's processing of the coreferential relationship between the gap and the head noun of the relative clause. The results of these two experiments provide mixed evidence with regard to this theory. In terms of speed of processing, response times from both experiments suggest that RPs do not facilitate quicker comprehension than gaps do. In terms of accuracy of processing, the results of Experiment 1 show that the presence of RPs does facilitate more accurate comprehension than gaps do within islands, while Experiment 2 shows the opposite effect outside of islands. The analysis of the effects of adjunct type on the interpretation of gaps vs. RPs also provides inconclusive results. RPs appear to raise accuracy rates in parallel adjuncts but not in causal adjuncts. According to the original predictions, this result goes against the comprehension facilitation hypothesis because RPs were thought to assist processing more in causal adjuncts, where the coreferential connection between the gap/RP position and the antecedent is stronger. This result, however, may actually fit with the hypothesis, as RPs could be functioning to improve the strength of the coreferential relationship in parallel adjuncts, which do not begin with as strong a connection between the gap position and antecedent as causal adjuncts do. Overall, Experiments 1 and 2 show that RPs do not facilitate the speed of processing but that they may improve accuracy of comprehension.

One possibility, which maintains the tenets of the comprehension facilitation hypothesis, is that resumption aids the comprehension of coreference within island violations and not within deeply embedded structures. This would account for the discrepancies between Experiments 1 and 2, specifically that RPs received higher ratings and may have improved comprehension of coreference within islands but not with embedding. Resumption consistently occurs outside of island structures in naturally produced speech,

however, so another function for resumption would be needed to account for those cases. Additionally, as stated above, the difficulty in computing the FGD seems a logical explanation for the increasingly degraded ratings of multiply embedded sentences, so it would be surprising if RPs did not function in any way to ease this processing difficulty.

Another explanation is that resumption helps the speaker, but not the listener, process the coreferential relationship between the gap position and the head noun. If resumption functions to help the speaker instead of the listener, then it follows that we may not observe any improvement in acceptability ratings, response times, and accuracy rates from the listener. The evidence for a speaker-centric explanation for resumption also works in the other direction, especially with regard to the embedding data from Experiment 2. If resumption does not improve listeners' ratings or comprehension, then why do speakers use them in the first place? Although many explanations exist that this experiment did not investigate, it is possible that speakers use RPs to help themselves process coreferential relationships during sentence production. Polinsky et al. (in press) suggest the same speaker-centered coreference theory. This hypothesis, however, is very difficult to test because it requires accessing the motivations and understanding of the speaker during sentence production.

Where does this leave us in our understanding of English resumption? First, resumption does not rescue island violations. It does eliminate ECP penalties, but this effect emerges as a consequence of its use and not its primary purpose. Second, although it does interact with distance, it does not amnesty the processing costs associated with embedding. Third, resumption does not facilitate listeners' comprehension in deeply embedded structures, but it may do so within islands. Finally, the lack of strong crossover effects described in Chapter 2 suggests that English resumption is processed not as a forward-

looking A'-dependency but as something more like cross-sentential anaphora, which establishes coreference but does so in a backward-looking direction.

Given these four principles, I propose two possible explanations for English resumption. The first account follows from the speaker-centered coreference theory and maintains that the function of resumption is to facilitate the semantic coreference between the gap position and the head noun of the relative clause during sentence production for the speaker (Polinsky et. al in press). The second account proposes that English resumption serves to create locally well-formed structures within globally ill-formed sentences (Asudeh 2012).

The first account relies on an important distinction between two aspects of the coindexed relationship between the gap and the head noun: the syntactic relationship (FGD) and the semantic relationship (coreference). Under this account, RPs do not mitigate penalties against the syntactic dependency and may even make it harder to compute a difficult FGD; RPs also incur a penalty of their own if the A'-dependency from the filler is still strong. Sentences with no embedding within the relative clause, for example, receive much lower ratings with RPs than with gaps because the FGD is still strong by the time the gap/RP position is reached, and switching to the anaphoric relationship incurs a large processing penalty. This switch in the method of establishing the syntactic relationship between the two elements echoes previous analyses (Chao and Sells 1983; Erteschik-Shir 1992; Dickey 1996; Alexopoulou and Keller 2007; Asudeh 2012). With additional levels of embedding, however, the penalty for maintaining the A'-dependency in working memory increases, and the penalty for switching to an anaphoric relationship decreases, thus explaining the results of Experiment 2. The FGD is blocked in islands, so there is no increased penalty for switching to the anaphoric dependency, which explains the similarity in

ratings between gaps and RPs within islands in previous studies and here (assuming that the main effect of gap type is purely a result of the removal of the ECP violation). Independent from these effects on the syntactic processing of the syntactic dependency, RPs strengthen the coreferential relationship between the two positions for the speaker. The speaker has a motivation to use an RP within an island because it has no negative effect on the acceptability of the sentence and strengthens the coreferential relationship. Outside of an island, the speaker may use an RP if the coreferential relationship requires emphasis, but because the FGD is still parsable, the sentence with the RP is less acceptable and more difficult to comprehend than its gapped counterpart. Under this account, the existence of resumption is explained by the semantic coreferential relationship, and the ratings and comprehension accuracy by the RP's interaction with the A'-dependency.

The second account builds on the work of Asudeh (2012) and Clemens et al. (2013). Here, the speaker inserts an RP during sentence production because it creates a syntactically and semantically well-formed structure locally, even though the entire utterance is ill-formed. In Asudeh 2012, both the matrix and relative clause are well-formed, while only the relative clause is well-formed under Clemens et al.'s account; for both, however, the combination of the two CPs into one sentence is ill-formed. RPs are no more acceptable than gaps because the syntactic and semantic composition of the entire sentence does not work out. With islands, the insertion of the RP can be explained as a mechanism to salvage some amount of well-formedness; with embedding, it may just be the complexity of the structure that makes the processor add the RP. Clemens et al. (2013) contend that the use of the RP does not represent a speech error because it is the "false start" of first part of the sentence that forces the speaker to start afresh and use a normal discourse pronoun in the embedded clause, which linguists call an RP. The debate over whether or not RPs are speech errors depends

on the definition of the term, but a broad definition may encompass the RPs produced under this account. Clemens et al. (2013) also argue that resumption should not even be considered intrusive resumption in the first place because its coreferential meaning is computed through cross-sentential anaphora and not through an A'-dependency; again, this debate centers on the definition of resumption, but if we accept a typological, and not syntactic, definition, then English resumption does still appear to fit into Sells' category of intrusive resumption.

These two explanations are tentative, and these experiments do not allow us to judge the plausibility of either account. Significant experimental work and additional theorizing will be necessary in order to achieve a full understanding of the function of English resumption. However, there are some conclusions we can draw about English resumption in the context of resumption cross-linguistically. English resumption is clearly not true resumption, as listeners do not judge English sentences with RPs to be acceptable, and RPs do not appear to be A'-bound variables because of the lack of strong crossover effects and the differences in interpretation attested by Chao and Sells (1983). Additionally, English resumption may not exhibit the distinction that Asudeh (2012) makes between complexity and island/ECP resumption. While this may exist as a typological distinction, in that English resumption is found both within and outside of islands, the results of these experiments suggest that both types of intrusive resumption are largely identical. The accounts proposed above emphasize the function of resumption and not the positions in which it occurs; if RPs are unified by their function, then it may not be productive to continue this distinction between complexity and island/ECP resumption, at least not in English.

6.2 Broader Significance of Research

The research presented here has significance for our understanding of the motivations of speakers during sentence production. As argued above, resumption might be motivated by the needs of the speaker and not by a desire to make the utterance as easy as possible for the listener to process and comprehend. Polinsky et al. (in press) make a similar argument convincingly, so I will limit this discussion to a summary of their main points and a brief section on how the data presented in this thesis speak to this issue. They suggest that the use of resumption by the speaker to maintain coreference fits with the “selfish speaker model” of language production, i.e. that some linguistic phenomena can be explained by the desire of the speaker to reduce effort and minimize the burden on working memory. When the speaker ends up in a structure in which creating an A'-dependency with an antecedent is difficult or impossible, he or she may insert an RP as a “last resort” mechanism to salvage some degree of well-formedness or to simplifying processing by removing the FGD. As they argue, subsuming resumption under the selfish speaker model allows us to make sense of the previous theoretical and experiment research. Theoretical linguistics, like Ross (1967) and Kroch (1981), found resumption to be acceptable because they evaluated sentences with RPs as a selfish speaker would. Participants in experimental studies, however, reject RPs because they view the sentences from the perspective of the listener. Polinsky et al. (in press) also mention disfluencies, like stops, starts, and restarts, as another example of a linguistic phenomenon that fits under the selfish speaker model.

The reality of the selfish speaker model also receives support from previous experimental studies that have examined the “model of the listener,” essentially the opposite of the selfish speaker model. In the model of the listener, the speaker is thought to take into account the needs and knowledge of the listener during sentence production. Dell and

Brown (1991) and Wardlow Lane and Ferreira (2008) provide evidence that in some circumstances speakers make linguistic choices that prevent listeners from achieving maximum comprehension. Dell and Brown (1991), for example, showed that speakers relied on the general typicality of a piece of information when deciding whether to include it in a retelling of story, rather than the importance of the role of that information within the story itself. Wardlow Lane and Ferreira (2008) found that participants referred to objects that listeners did not know existed after being asked to help them select certain items, especially when the privileged object was made more salient. While both of these results relate to the conveyance of information on a larger scale than the syntactic level that resumption operates, it seems plausible that this selfish speaker pressure also occurs in the realm of syntax and processing.

The results of this study fit with the inclusion of the resumption within the selfish speaker model. Speakers produce sentences with RPs in embedded structures, but as shown in Experiment 2, participants judge these sentences as less acceptable than their counterparts with gaps and have more difficulty comprehending them. If we accept that the results of Experiment 1 represent an ECP-rescuing effect and not the rescuing of the island violation, then the acceptability judgments and accuracy data for RPs within islands also support this claim. The selfish speaker model works with both of the concluding accounts of resumption given above. Under the first, RPs help the speaker maintain coreference, which explains their use, but the listener has more difficulty processing sentences with resumption because of the penalty of switching from the A'-dependency to the anaphoric interpretation. Under the second, RPs serve to maintain some degree of local well-formedness, which explains their use, but the listener has difficulty parsing the sentence syntactically or semantically because it is globally ill-formed.

Finally, it is important to note that the use of the selfish speaker model to explain resumption does not mean that all linguistic phenomena are explainable through selfish motivations of the speaker. Many aspects of language production have been shown to be listener-centric, but resumption may occur because of speaker-centric motives.

6.3 Methodological Considerations and Future Directions

Although I do not think that the following methodological considerations had an effect on the conclusions drawn from these experiments, they are worth mentioning in order to contextualize this research and ensure proper methodology going forward.

First, I collected the data for both experiments through Amazon Mechanical Turk. The use of Mechanical Turk has obvious advantages, most notably that I was able to collect data from 100 participants for each experiment for \$100 within about two hours. Running the same number of participants in person would have cost at least \$500 and taken over 50 hours. However, it is more difficult to control the participants and the experimental setting on Mechanical Turk than in person. Although participants were excluded for a number of reasons, it is impossible to be sure that non-native English speakers did not lie on the background questions, for example, or that the participants were paying attention to the experiment the entire time. That said, Mechanical Turk has proven to be extremely useful for linguistics research, and an analysis comparing the data from the same experiment run in person and on Mechanical Turk concluded that both methods produce comparable results (Sprouse 2010). Thus, I believe that the use of Mechanical Turk enhanced this study by allowing for a large sample size with few negative effects on the reported results.

Second, some may object that the comprehension questions accuracy rates reported in the two experiments, which fall to as low as 55% for sentences with gaps in two level of embedding, show that participants were either not paying attention to the stimuli or were so

confused by them that they could not give fair acceptability ratings. I calculated the accuracy rates by including responses of “unknown” as incorrect because the experiment was testing whether or not the coreferential relationship in the sentence was more or less clear with the RP than with the gap, and a response of “unknown” meant that the proper coreferential meaning was not conveyed. When calculating accuracy rates to exclude participants based on poor performance, however, I chose to remove the “unknown” responses because many of the sentences were ungrammatical and complex, and it is understandable if participants were not able to parse them properly. With these rates and a cut off of 70%, only four and six participants were excluded in Experiments 1 and 2, respectively. A recalculation of the rate in Figures 3 and 9 that excludes “unknown” responses shows that the average accuracy rates for all of the conditions is over 70%, as shown here:

	Zero	One	Two	WIC	CNPC	AC
Gap	91.34%	81.78%	78.39%	83.04%	79.28%	72.84%
RP	91.27%	78.39%	73.36%	85.48%	72.38%	72.93%

Table 1: Recalculated Comprehension Question Accuracy Rates for Experiments 1 and 2

The percentages in Table 1 suggest that most of the participants were paying attention to the stimuli, although the complexity of the sentences may have prevented them from understanding all of them.

Third, because this study only tested gaps and RPs in the subject position, it made it difficult to separate the effects of a number of variables. Three different variables could have affected the acceptability judgments and accuracy rates for the RPs in the two experiments: the increased likelihood of coreference in the subject position, the removal of the ECP violation, and the potential island/syntactic complexity-rescuing effects of the RP. As stated above, for example, it is impossible to conclude whether the acceptability judgments from

Experiment 1 (Figure 1) are explicable due solely to the removal of the ECP penalty or to a combination of ECP and island-rescuing. The privileged status of coreference with subjects over objects is confounded by the fact that ECP affects subject gaps and not object gaps. Although it is difficult to fully tease apart these different variables, it is important to keep in mind the multiple interpretations that the results of these two experiments can have.

A number of follow-up studies are necessary to gain a fuller understanding of the use, function, and acceptability of resumption in English. First, in order to distinguish between ECP and island-rescuing effects, it is important to test RPs in the object position of islands with auditory stimuli. Emerging work from Clemens et al. (2013) suggests that, as expected, RPs in the object position of islands receive similarly poor ratings as gaps, which suggests that the results of Experiment 1 are purely due to the removal of the ECP penalty and that resumption does not have an island-rescuing property. Second, a more detailed study of the effects of distance on the acceptability and interpretation of RPs is necessary. Like Alexopoulou and Keller 2007 and Han et al. 2012, this study tested sentences with zero, one, or two levels of embedding within the relative clause, but no study has tested more than two levels to see whether the observed interaction causes RPs to become more acceptable than gaps with three or more levels of embedding. Previous studies have also only examined distance as embedding and have largely ignored linear distance; an experiment that tests minimal pairs that distinguish between linear distance and embedding would help us to understand whether resumption interacts with these two types of distance in different ways.

Third, although the results fit with the ECP-rescuing effect from McDaniel and Cowart 1999 and Han et al. 2012, the only study that tested RPs in ECP-violating positions outside of islands, specifically in *that*-trace positions, found that participants rated RPs as equally as unacceptable as gaps (Alexopoulou and Keller 2005). I predict that a study with

auditory stimuli would find a similar effect as in Experiment 1, with higher acceptability judgments for RPs than for gaps, but it is important to confirm that the ECP-rescuing property of RPs is not restricted to islands. Fourth, as noted above, Hawkin's (2004) theory about resumption and the Accessibility Hierarchy was not tested in this study, and it is possible that we would see a rescuing effect with RPs in positions low on the hierarchy. Testing RPs as objects of comparative and obliques, for example, would allow us to confirm that resumption has no rescuing effect beyond the removal of the ECP penalty.

Further research is also necessary to test the speaker-centric coreference theory for the function of resumption. One direction would be to manipulate the likelihood of coreference to see whether this has any effect on the acceptability judgments or comprehension of sentences with RPs. The adjunct type subanalysis of Experiment 1 was an attempt to manipulate the likelihood of coreference, but there are a number of other ways to do so by employing stress, pitch, and context. Although we would expect RPs to respond to these manipulations largely like regular pronouns, the effects may be stronger if the function of resumption does relate to the maintenance of coreference. A second possible direction is to examine the account articulated above that the coreferential function of resumption is purely speaker-centric; such a theory would suggest that the acceptability judgments and accuracy rates of the listener were not the correct place to look for effects, as was done here. Testing the same variables for the speaker is much more difficult, but if resumption is a device purely for the benefit of the speaker, we would expect to see an effect in speakers' comprehension of sentences that they just uttered. Zukowski and Larsen 2004 and Ferreira and Swets 2005 could serve as examples of how to force speakers to produce sentences with RPs, but more thought is required to develop a system for testing speakers' assessments and comprehension of sentences that they just produced.

7 Conclusion

The purpose of this thesis was to investigate English RPs and to test the comprehension facilitation hypothesis of resumption, i.e. that RPs serve to facilitate the listener's processing of the coreferential relationship between the head noun of a relative clause and the gap. Experiment 1 tested RPs in island structures and found that subject RPs were more acceptable than subject gaps in *wh*-, CNP, and adjunct islands. Sentences with RPs in adjunct and *wh*-islands also had higher comprehension question accuracy rates than those with gaps. Experiment 2 tested RPs in embedding structures and found that RPs were less acceptable than gaps outside of island structures but that gaps received a larger acceptability penalty per level of embedding than RPs. RPs also resulted in lower comprehension question accuracy rates. Both experiments showed no difference between response times for sentences with RPs and sentences with gaps. These results provide mixed evidence with regard to the comprehension facilitation hypothesis, as RPs may improve accuracy of comprehension but appear to have no effect on speed of processing.

These experiments suggest the following understanding of resumption. RPs appear to rescue ECP violations but do not improve the acceptability of islands or deeply embedded structures. They acquire their semantic meaning via a backward-looking anaphora, not a forward-looking A'-dependency like gaps. They may also improve comprehension accuracy. I conclude with two proposals for the function and use of English resumption, that RPs serve either as a coreference device purely for the speaker's benefit or as a method of forming locally well-formed structures. This conclusion suggests that resumption may be subsumed under a speaker-centric model of language production. Future directions include testing RPs in linear distance and in ECP-violating positions outside of islands and further investigating the effects of manipulating coreference on the interpretation of resumption.

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Appendix

A Experimental Stimuli

Experiment 1: Resumption in Islands

There were 20 critical items and 30 fillers. Within the critical items, conditions a, c, and e had gaps whereas conditions b, d, and f had RPs. Additionally, conditions a and b contained wh-islands, c and d CNP islands, and e and f adjunct islands. Thus, the distribution of conditions was as follows:

- a = gap, wh-island
- b = RP, wh-island
- c = gap, CNP island
- d = RP, CNP island
- e = gap, adjunct island
- f = RP, adjunct island

Finally, items 1, 3, 5, 8, 9, 12, 13, 14, 16, 20 contained causal adjuncts within conditions e and f; the rest contained parallel adjuncts.

Item	Stimulus
1a	The doctor consoled the patient who the test had confirmed why had a dangerous disease.
1b	The doctor consoled the patient who the test had confirmed why he had a dangerous disease.
1c	The doctor consoled the patient who the fact that had a dangerous disease called for new medication.
1d	The doctor consoled the patient who the fact that he had a dangerous disease called for new medication.
1e	The doctor consoled the patient who the test came back positive because had a dangerous disease
1f	The doctor consoled the patient who the test came back positive because he had a dangerous disease
2a	Miranda yelled at her daughter who the storeowner asked why broke the expensive lamp
2b	Miranda yelled at her daughter who the storeowner asked why she broke the expensive lamp
2c	Miranda yelled at her daughter who the fact that broke the lamp upset the storeowner.
2d	Miranda yelled at her daughter who the fact that she broke the lamp upset the storeowner.
2e	Miranda yelled at her daughter who the storeowner was reading while broke the lamp.
2f	Miranda yelled at her daughter who the storeowner was reading while she broke the lamp.
3a	The editor caught the junior reporter who Michelle had said how stole the story
3b	The editor caught the junior reporter who Michelle had said how he stole the story
3c	The editor caught the reporter who the fact that stole the story surprised the public.

3d	The editor caught the reporter who the fact that he stole the story surprised the public.
3e	The editor caught the reporter who the public was surprised because stole the story.
3f	The editor caught the reporter who the public was surprised because he stole the story.
4a	The researcher chastised her young colleague who Greg realized which mistake had made
4b	The researcher chastised her young colleague who Greg realized which mistake she had made
4c	The researcher chastised her colleague who the fact that made a mistake angered the professor.
4d	The researcher chastised her colleague who the fact that she made a mistake angered the professor.
4e	The researcher chastised her colleague who Greg had run a good experiment while had made a mistake.
4f	The researcher chastised her colleague who Greg had run a good experiment while she had made a mistake.
5a	The CEO fired the lazy employee who the company knew which days of work skipped.
5b	The CEO fired the lazy employee who the company knew which days of work he skipped.
5c	The CEO fired the employee who the fact that skipped work annoyed the company.
5d	The CEO fired the employee who the fact that he skipped work annoyed the company
5e	The CEO fired the employee who the company lost revenue because skipped work.
5f	The CEO fired the employee who the company lost revenue because he skipped work.
6a	The counselor praised the student who Mrs. McMalley explained how passed the exam.
6b	The counselor praised the student who Mrs. McMalley explained how he passed the exam
6c	The counselor praised the student who the fact that passed the exam excited Mrs. McMalley.
6d	The counselor praised the student who the fact that he passed the exam excited Mrs. McMalley.
6e	The counselor praised the student who Grace got a failing grade while passed the exam.
6f	The counselor praised the student who Grace got a failing grade while he passed the exam.
7a	The waiter seated the impatient customer who Karen said which hostess nagged.
7b	The waiter seated the impatient customer who Karen said which hostess he nagged.
7c	The waiter seated the customer who the fact that nagged the hostess secured a table.
7d	The waiter seated the customer who the fact that he nagged the hostess secured a table.
7e	The waiter seated the impatient customer who Karen waited while nagged the hostess.
7f	The waiter seated the impatient customer who Karen waited while he nagged the hostess.
8a	The lawyer defended his client who Nora knew which house burned down with a match.
8b	The lawyer defended his client who Nora knew which house he burned down with a match.
8c	The lawyer defended his client who the fact that burned down the house was obvious.
8d	The lawyer defended his client who the fact that he burned down the house was obvious
8e	The lawyer defended his client who Nora began a lawsuit because burned down the house.
8f	The lawyer defended his client who Nora began a lawsuit because he burned down the house.
9a	The woman encouraged her aunt who Michael announced why was running the marathon

9b	The woman encouraged her aunt who Michael announced why she was running the marathon
9c	The woman encouraged her aunt who the fact that was running a marathon impressed Michael.
9d	The woman encouraged her aunt who the fact that she was running a marathon impressed Michael.
9e	The woman encouraged her aunt who Michael was happy because was running a marathon.
9f	The woman encouraged her aunt who Michael was happy because she was running a marathon.
10a	The girl made fun of her less intelligent sister who their father explained which class failed.
10b	The girl made fun of her less intelligent sister who their father explained which class she failed.
10c	The girl made fun of her less intelligent sister who the fact that failed a class annoyed their father.
10d	The girl made fun of her less intelligent sister who the fact that she failed a class annoyed their father.
10e	The girl made fun of her less intelligent sister who their father was unaware while failed a class.
10f	The girl made fun of her less intelligent sister who their father was unaware while she failed a class.
11a	The homeowner paid the interior decorator who Daniel knew which rooms redesigned
11b	The homeowner paid the interior decorator who Daniel knew which rooms she redesigned
11c	The homeowner paid the interior decorator who the fact that redesigned five rooms impressed Daniel
11d	The homeowner paid the interior decorator who the fact that she redesigned five rooms impressed Daniel
11e	The homeowner paid the interior decorator who Daniel was away while redesigned five rooms
11f	The homeowner paid the interior decorator who Daniel was away while she redesigned five rooms
12a	The famous painter thanked the beautiful woman who Richard remembered how long posed for
12b	The famous painter thanked the beautiful woman who Richard remembered how long she posed for
12c	The painter thanked the woman who the fact that posed for an entire hour amazed Richard
12d	The painter thanked the woman who the fact that she posed for an entire hour amazed Richard
12e	The painter thanked the woman who Richard was amazed because posed for an entire hour
12f	The painter thanked the woman who Richard was amazed because she posed for an entire hour
13a	The tennis player congratulated his partner who Barbara saw which shot made in the championship match

13b	The tennis player congratulated his partner who Barbara saw which shot he made in the championship match
13c	The tennis player congratulated his partner who the fact that made the winning shot shocked Barbara
13d	The tennis player congratulated his partner who the fact that he made the winning shot shocked Barbara
13e	The tennis player congratulated his partner who Barbara was shocked because made the winning shot
13f	The tennis player congratulated his partner who Barbara was shocked because he made the winning shot
14a	The actor praised the talented writer who Lauren asked which script wrote in the past year.
14b	The actor praised the talented writer who Lauren asked which script he wrote in the past year.
14c	The actor praised the writer who the fact wrote the script for an award-winning movie impressed Lauren.
14d	The actor praised the writer who the fact he wrote the script for an award-winning movie impressed Lauren.
14e	The actor praised the writer who Lauren was impressed because wrote the script for an award-winning movie.
14f	The actor praised the writer who Lauren was impressed because he wrote the script for an award-winning movie.
15a	The quarterback passed to the wide receiver who Maria witnessed where ran on the previous play
15b	The quarterback passed to the wide receiver who Maria witnessed where he ran on the previous play
15c	The quarterback passed to the wide receiver who the fact that ran out-of-bounds angered Maria
15d	The quarterback passed to the wide receiver who the fact that he ran out-of-bounds angered Maria
15e	The quarterback passed to the wide receiver who Maria was talking to the referee while ran out-of-bounds
15f	The quarterback passed to the wide receiver who Maria was talking to the referee while he ran out-of-bounds
16a	The spoiled princess insulted her mother who the baron knew who invited to dinner last weekend
16b	The spoiled princess insulted her mother who the baron knew who she invited to dinner last weekend
16c	The princess insulted her mother who the fact that invited the duke to dinner pleased the baron
16d	The princess insulted her mother who the fact that she invited the duke to dinner pleased the baron
16e	The princess insulted her mother who the baron was pleased because invited the duke to dinner
16f	The princess insulted her mother who the baron was pleased because she invited the duke to dinner

17a	The veterinarian approached Gillian who Max knew which dog brought into the clinic for treatment
17b	The veterinarian approached Gillian who Max knew which dog she brought into the clinic for treatment
17c	The veterinarian approached Gillian who the fact that brought in the sick dog to the clinic saddled Max.
17d	The veterinarian approached Gillian who the fact that she brought in the sick dog to the clinic saddled Max.
17e	The veterinarian approached Gillian who Max was at work while brought in the sick dog to the clinic
17f	The veterinarian approached Gillian who Max was at work while she brought in the sick dog to the clinic
18a	The powerful ambassador greeted the foreign diplomat who Hillary wondered where carried the confidential documents
18b	The powerful ambassador greeted the foreign diplomat who Hillary wondered where he carried the confidential documents
18c	The ambassador greeted the foreign diplomat who the fact that carried the confidential documents delighted Hillary
18d	The ambassador greeted the foreign diplomat who the fact that he carried the confidential documents delighted Hillary
18e	The ambassador greeted the foreign diplomat who Hillary was giving a speech while carried away the confidential documents
18f	The ambassador greeted the foreign diplomat who Hillary was giving a speech while he carried away the confidential documents
19a	The passenger watched the flight attendant who Timothy mentioned how moved the cart
19b	The passenger watched the flight attendant who Timothy mentioned how she moved the cart
19c	The passenger watched the flight attendant who the fact that moved the cart bothered Timothy
19d	The passenger watched the flight attendant who the fact that she moved the cart bothered Timothy
19e	The passenger watched the flight attendant who Timothy was sleeping while moved the cart
19f	The passenger watched the flight attendant who Timothy was sleeping while she moved the cart
20a	The fashion designer helped the model who Dominic heard which zipper tore on the expensive dress
20b	The fashion designer helped the model who Dominic heard which zipper she tore on the expensive dress
20c	The fashion designer helped the model who the fact that tore the zipper on the expensive dress worried Dominic
20d	The fashion designer helped the model who the fact that she tore the zipper on the expensive dress worried Dominic
20e	The fashion designer helped the model who Dominic was worried because tore the zipper on the expensive dress

20f	The fashion designer helped the model who Dominic was worried because she tore the zipper on the expensive dress
F1	No pyramids that the archaeologists have explored have ever been declared off-limits to tourists.
F2	Very few economists that work in downtown DC will traveling to Russia this year.
F3	No homework assignments that the cruel professor assigned will count in the course average.
F4	The surgeon who worked with anesthesiologists upset himself with the patient who kept complaining.
F5	The girls that rode the elephants at the beginning of the parade was from Africa.
F6	If the award-winning chef had entered this competition, he surely would have won first prize.
F7	The teacher that watched the play starring his students were pleased by the final scene.
F8	Only two secret spies that know about this mission could know where the documents are.
F9	The nurse that the doctor had been searching for was upset with herself for failing.
F10	The bills that no democratic senators supported will ever become law.
F11	The networks which no hackers could hack have ever had strong security.
F12	No organizations that the charity groups endorsed have ever harmed the environment.
F13	Very few romance novels that the author wrote will containing offensive content.
F14	If the pirate kidnapped the princess, the entire army searches for him.
F15	The cowboy that the bulls trampled injured herself getting off a horse.
F16	Most bacteria that the health experts have carefully studied have caused serious epidemics.
F17	The child that chases the neighbor's dogs around the yard likes playing games.
F18	If the general consults his officers, they would have won the battle easily.
F19	The soldiers that the camp lodges each summer love staying in the wilderness.
F20	The tenants that the landlord despised has been evicted for not paying rent.
F21	Who did the surgeon think missed the appointment for a kidney transplant on Wednesday?
F22	What did the friend tell John that fell off of the bookshelf in the room on the third floor?
F23	What did Alice announce to her mother that scratched the newly polished floor of the kitchen?
F24	Who did the policeman believe stole the precious diamond from the exhibit at the museum?
F25	What did the biker desire that would happen to one of his competitors in the race?
F26	Who did the salesman for the shoe company worry that he would offend the friend of?
F27	What does the interns think that they will be doing after being hired by the political campaign
F28	Where does the young journalist think that his story will do for his career?
F29	Who did the television recruit Anthony because the parents of recommended for the position?
F30	How did the pilot of the prime minister's private plane injure himself?

Experiment 2: Resumption in Embedded Structures

There were 20 critical items and 30 fillers. Within the critical items, conditions i, k, and m had gaps whereas conditions j, l, and n had RPs. Additionally, conditions i and j contained no embedding within the relative clause, k and l one level of embedding, and m and n two levels of embedding. Thus, the distribution of conditions was as follows:

- i = gap, no embedding
- j = RP, no embedding
- k = gap, one level of embedding
- l = RP, one level of embedding
- m = gap, two levels of embedding
- n = RP, two levels of embedding

Item	Stimulus
1i	The well-known doctor consoled the aging patient who had a dangerous, incurable disease
1j	The well-known doctor consoled the aging patient who he had a dangerous, incurable disease
1k	The well-known doctor consoled the aging patient who the nurse stated had a dangerous disease
1l	The well-known doctor consoled the aging patient who the nurse stated he had a dangerous disease.
1m	The doctor consoled the patient who the family members mentioned that the nurse stated had a dangerous disease
1n	The doctor consoled the patient who the family members mentioned that the nurse stated he had a dangerous disease
2i	Miranda yelled at her careless daughter who broke the expensive antique lamp.
2j	Miranda yelled at her careless daughter who she broke the expensive antique lamp.
2k	Miranda yelled at her careless daughter who the storeowner believed broke the lamp.
2l	Miranda yelled at her careless daughter who the storeowner believed she broke the lamp.
2m	Miranda yelled at her daughter who a customer knew that the storeowner believed broke the lamp.
2n	Miranda yelled at her daughter who a customer knew that the storeowner believed she broke the lamp.
3i	The editor-in-chief caught the junior reporter who stole the shocking news story.
3j	The editor-in-chief caught the junior reporter who he stole the shocking news story.
3k	The editor-in-chief caught the junior reporter who Michelle said stole the story.
3l	The editor-in-chief caught the junior reporter who Michelle said he stole the story.
3m	The editor caught the reporter who the public knew that Michelle said stole the story.
3n	The editor caught the reporter who the public knew that Michelle said he stole the story.
4i	The researcher chastised her young colleague who made a mistake in the latest experiment.

4j	The researcher chastised her young colleague who she made a mistake in the latest experiment.
4k	The researcher chastised her colleague who Greg said made a mistake in the latest experiment.
4l	The researcher chastised her colleague who Greg said she made a mistake in the latest experiment.
4m	The researcher chastised her colleague who John reported that Greg said made a mistake.
4n	The researcher chastised her colleague who John reported that Greg said she made a mistake.
5i	The CEO fired the lazy employee who skipped days of work many times in the past month.
5j	The CEO fired the lazy employee who he skipped days of work many times in the past month.
5k	The CEO fired the employee who the records stated skipped days of work many times.
5l	The CEO fired the employee who the records stated he skipped days of work many times.
5m	The CEO fired the employee who the company suggested that the records stated skipped work.
5n	The CEO fired the employee who the company suggested that the records stated he skipped work.
6i	The counselor praised the struggling student who passed the difficult history exam.
6j	The counselor praised the struggling student who he passed the difficult history exam.
6k	The counselor praised the student who Mrs. McMalley explained passed the difficult exam.
6l	The counselor praised the student who Mrs. McMalley explained he passed the difficult exam.
6m	The counselor praised the student who Grace thought that Mrs. McMalley explained passed the exam.
6n	The counselor praised the student who Grace thought that Mrs. McMalley explained he passed the exam.
7i	The waiter at the fancy restaurant seated the impatient customer who nagged the hostess.
7j	The waiter at the fancy restaurant seated the impatient customer who he nagged the hostess.
7k	The inexperienced waiter seated the impatient customer who Karen said nagged the hostess.
7l	The inexperienced waiter seated the impatient customer who Karen said he nagged the hostess.
7m	The waiter seated the customer who the chefs heard that Karen said nagged the hostess.
7n	The waiter seated the customer who the chefs heard that Karen said he nagged the hostess.
8i	The notable lawyer defended his infamous client who burned down the tall, white house.
8j	The notable lawyer defended his infamous client who he burned down the tall, white house.
8k	The notable lawyer defended his infamous client who Nora said burned down the house.
8l	The notable lawyer defended his infamous client who Nora said he burned down the house.

8m	The lawyer defended his client who the jury saw that Nora said burned down the house
8n	The lawyer defended his client who the jury saw that Nora said he burned down the house
9i	The loving woman encouraged her aging aunt who was running a difficult marathon.
9j	The loving woman encouraged her aging aunt who she was running a difficult marathon.
9k	The loving woman encouraged her aunt who Michael announced was running a marathon.
9l	The loving woman encouraged her aunt who Michael announced she was running a marathon.
9m	The woman encouraged her aunt who the nephew declared that Michael announced was running a marathon.
9n	The woman encouraged her aunt who the nephew declared that Michael announced she was running a marathon.
10i	The mean-spirited girl made fun of her less intelligent sister who failed a hard math class.
10j	The mean-spirited girl made fun of her less intelligent sister who she failed a hard math class.
10k	The girl made fun of her less intelligent sister who their father explained failed a hard class.
10l	The girl made fun of her less intelligent sister who their father explained she failed a hard class.
10m	The girl made fun of her sister who their father explained that Mr. Williams said failed a class.
10n	The girl made fun of her sister who their father explained that Mr. Williams said she failed a class.
11i	The homeowner paid the well-known interior decorator who redesigned five beautiful rooms
11j	The homeowner paid the well-known interior decorator who she redesigned five beautiful rooms
11k	The homeowner paid the well-known interior decorator who Daniel knew redesigned five rooms
11l	The homeowner paid the well-known interior decorator who Daniel knew she redesigned five rooms
11m	The homeowner paid the interior decorator who the husband inferred that Daniel knew redesigned five rooms
11n	The homeowner paid the interior decorator who the husband inferred that Daniel knew she redesigned five rooms
12i	The famous painter thanked the beautiful woman who posed for an entire hour in the studio
12j	The famous painter thanked the beautiful woman who she posed for an entire hour in the studio
12k	The famous painter thanked the woman who Richard remembered posed for an entire hour in the studio
12l	The famous painter thanked the woman who Richard remembered she posed for an entire hour in the studio
12m	The painter thanked the woman who the art dealers mentioned that Richard remembered posed for an entire hour
12n	The painter thanked the woman who the art dealers mentioned that Richard remembered she posed for an entire hour.

13i	The tennis player congratulated his partner who made the winning shot in the championship match
13j	The tennis player congratulated his partner who he made the winning shot in the championship match
13k	The tennis player congratulated his partner who Barbara knew made the winning shot in the match
13l	The tennis player congratulated his partner who Barbara knew he made the winning shot in the match
13m	The tennis player congratulated his partner who the sister heard that Barbara thought made the winning shot
13n	The tennis player congratulated his partner who the sister heard that Barbara thought he made the winning shot
14i	The actor praised the writer who developed the script for the award-winning movie in the past year.
14j	The actor praised the writer who he developed the script for the award-winning movie in the past year.
14k	The actor praised the writer who Lauren found out wrote the script for the award-winning movie
14l	The actor praised the writer who Lauren found out he wrote the script for the award-winning movie
14m	The actor praised the writer who the critics reported that Lauren found out wrote the script for the movie
14n	The actor praised the writer who the critics reported that Lauren found out he wrote the script for the movie
15i	The quarterback passed to the quick wide receiver who ran out-of-bounds on the previous play.
15j	The quarterback passed to the quick wide receiver who he ran out-of-bounds on the previous play.
15k	The quarterback passed to the quick wide receiver who the referees witnessed ran out-of-bounds
15l	The quarterback passed to the quick wide receiver who the referees witnessed he ran out-of-bounds
15m	The quarterback passed to the wide receiver who Maria said that the referees witnessed ran out-of-bounds
15n	The quarterback passed to the wide receiver who Maria said that the referees witnessed he ran out-of-bounds
16i	The spoiled princess insulted her mother who invited the old duke to dinner last weekend
16j	The spoiled princess insulted her mother who she invited the old duke to dinner last weekend
16k	The spoiled princess insulted her mother who the baron thought invited the old duke to dinner
16l	The spoiled princess insulted her mother who the baron thought she invited the old duke to dinner
16m	The princess insulted her mother who the the guests knew that the baron thought invited the old duke to dinner

16n	The princess insulted her mother who the guests knew that the baron thought she invited the old duke to dinner
17i	The veterinarian approached Gillian who brought in the sick dog to the clinic for treatment
17j	The veterinarian approached Gillian who she brought in the sick dog to the clinic for treatment
17k	The veterinarian approached Gillian who Max reported brought in the sick dog to the clinic for treatment
17l	The veterinarian approached Gillian who Max reported she brought in the sick dog to the clinic for treatment
17m	The veterinarian approached Gillian who the staff said that Max reported brought in the sick dog to the clinic
17n	The veterinarian approached Gillian who the staff said that Max reported she brought in the sick dog to the clinic
18i	The powerful ambassador greeted the foreign diplomat who carried the confidential documents in a briefcase
18j	The powerful ambassador greeted the foreign diplomat who he carried the confidential documents in a briefcase
18k	The ambassador greeted the foreign diplomat who Hillary suspected carried the confidential documents
18l	The ambassador greeted the foreign diplomat who Hillary suspected he carried the confidential documents
18m	The ambassador greeted the foreign diplomat who the press knew that Hillary suspected carried the confidential documents
18n	The ambassador greeted the foreign diplomat who the press knew that Hillary suspected he carried the confidential documents
19i	The impatient passenger watched the flight attendant who moved the cart to the back of the plane
19j	The impatient passenger watched the flight attendant who she moved the cart to the back of the plane
19k	The passenger watched the flight attendant who Timothy mentioned moved the cart to the back of the plane
19l	The passenger watched the flight attendant who Timothy mentioned she moved the cart to the back of the plane
19m	The passenger watched the flight attendant who Jim said that Timothy mentioned moved the cart
19n	The passenger watched the flight attendant who Jim said that Timothy she mentioned moved the cart
20i	The fashion designer helped the beautiful model who tore the zipper on the expensive dress
20j	The fashion designer helped the beautiful model who she tore the zipper on the expensive dress
20k	The fashion designer helped the model who Dominic heard tore the zipper on the expensive dress

20l	The fashion designer helped the model who Dominic heard she tore the zipper on the expensive dress
20m	The fashion designer helped the model who the assistants declared that Dominic heard tore the zipper on the dress
20n	The fashion designer helped the model who the assistants declared that Dominic heard she tore the zipper on the dress
F1	No pyramids that the archaeologists have explored have ever been declared off-limits to tourists.
F2	No professional drivers who have ever been in an accident can driving school buses.
F3	Very few economists that work in downtown DC will traveling to Russia this year.
F4	After the political campaign group hired new interns, they will doing lots of work.
F5	No homework assignments that the cruel professor assigned will count in the course average.
F6	The surgeon who worked with anesthesiologists upset himself with the patient who kept complaining.
F7	The girls that rode the elephants at the beginning of the parade was from Africa.
F8	If the award-winning chef had entered this competition, he surely would have won first prize.
F9	The teacher that watched the play starring his students were pleased by the final scene.
F10	Only two secret spies that know about this mission could know where the documents are.
F11	If the homemade beer had been left to ferment more, it would have been drinkable.
F12	The nurse that the doctor had been searching for was upset with herself for failing.
F13	A young journalist wrote the article which were the source of many scandalous accusations
F14	The salesman that examined the brand new line of products worry about his job everyday.
F15	The bills that no democratic senators supported will ever become law.
F16	No substitute teachers that know advanced calculus can work on Fridays.
F17	The networks which no hackers could hack have ever had strong security.
F18	No organizations that the charity groups endorsed have ever harmed the environment.
F19	Very few romance novels that the author wrote will containing offensive content.
F20	If the pirate kidnapped the princess, the entire army searches for him.
F21	The television station recruited the wrestlers since they worked out eight hours a day.
F22	The waiter that the manager scolded in front of customers defended herself.
F23	The cowboy that the bulls trampled injured herself getting off a horse.
F24	Most bacteria that the health experts have carefully studied have caused serious epidemics.
F25	The child that chases the neighbor's dogs around the yard likes playing games.
F26	If the general consults his officers, they would have won the battle easily.
F27	The soldiers that the camp lodges each summer love staying in the wilderness.
F28	The pilot injured himself quite badly because he did not see the final step on the staircase
F29	The tenants that the landlord despised has been evicted for not paying rent.
F30	The company that always ignored the environmental regulations was fined thousands of dollars.

B Regression Models

Experiment 1: Resumption in Islands

Table 1: Acceptability Ratings by Island Type

	Estimate	t value	pMCMC	Pr ($> t $)
AC/gap	2.2581	23.435	0.0001	0.0000
Gap \rightarrow RP	0.33119	8.196	0.0001	0.0000
AC \rightarrow CNPC	0.11089	1.592	0.1152	0.1117
CNPC \rightarrow WIC	0.10702	1.535	0.1318	0.1249
AC/gap \rightarrow CNPC/RP	-0.29603	-2.994	0.0026	0.0028
CNPC/gap \rightarrow WIC/RP	0.07448	0.748	0.4850	0.4543

Table 2: Response Times by Island Type

	Estimate	t value	pMCMC	Pr ($> t $)
AC/gap	4476.76	16.630	0.0001	0.0000
Gap \rightarrow RP	154.38	0.976	0.3364	0.3292
AC \rightarrow CNPC	-72.69	-0.266	0.8160	0.7899
CNPC \rightarrow WIC	400.08	1.468	0.1486	0.1424
AC/gap \rightarrow CNPC/RP	114.44	0.296	0.7750	0.7672
CNPC/gap \rightarrow WIC/RP	-629.36	-1.617	0.1216	0.1060

Table 3: Comprehension Question Accuracy Rates by Island Type

	Estimate	t value	pMCMC	Pr ($> t $)
AC/gap	0.628194	16.538	0.0001	0.0000
Gap \rightarrow RP	0.053935	2.590	0.0106	0.0097
AC \rightarrow CNPC	0.081569	2.272	0.0198	0.0232
CNPC \rightarrow WIC	-0.003646	-0.101	0.9122	0.9192
AC/gap \rightarrow CNPC/RP	0.0341337	0.670	0.4998	0.5031
CNPC/gap \rightarrow WIC/RP	0.062437	1.217	0.2166	0.2236

Table 4: Acceptability Ratings by Adjunct Type

	Estimate	t value	pMCMC	Pr ($> t $)
Causal/gap	2.1649	15.832	0.0001	0.0000
Gap \rightarrow RP	0.6023	5.930	0.0001	0.0000
Causal \rightarrow Parallel	-0.0456	-0.299	0.8244	0.7648
Causal/gap \rightarrow Parallel/RP	-0.1945	-1.375	0.1398	0.1698

Table 5: Response Times by Adjunct Type

	Estimate	t value	pMCMC	Pr ($> t $)
Causal/gap	4503.0	10.317	0.0001	0.0000
Gap \rightarrow RP	-340.8	-0.849	0.4154	0.3962
Causal \rightarrow Parallel	-213.5	-0.414	0.6366	0.6789
Causal/gap \rightarrow Parallel/RP	1160.7	2.075	0.0364	0.0384

Table 6: Comprehension Question Accuracy Rates by Island Type

	Estimate	t value	pMCMC	Pr ($> t $)
Causal/gap	0.63417	8.824	0.0001	0.0000
Gap \rightarrow RP	-0.02550	-0.494	0.6810	0.6217
Causal \rightarrow Parallel	-0.11062	-1.124	0.2224	0.2616
Causal/gap \rightarrow Parallel/RP	0.14178	1.972	0.0624	0.0490

Experiment 2: Resumption in Embedded Structures

Table 7: Acceptability Ratings by Level of Embedding

	Estimate	χ^2	Pr ($> \chi^2$)
Gap Type	-1.84741	279.500	$< 2.2e-16$
Level of Embedding	-0.93574	259.95	$< 2.2e-16$
Gap Type and Level of Embedding	0.78235	219.80	$< 2.2e-16$

Table 8: Response Times by Level of Embedding

	Estimate	χ^2	Pr ($> \chi^2$)
Gap Type	359.4	20.332	0.2057
Level of Embedding	382.3	56.165	2.286e-06
Gap Type and Level of Embedding	-264.7	5.1949	0.817

Table 9: Comprehension Question Accuracy Rates by Level of Embedding

	Estimate	χ^2	Pr ($> \chi^2$)
Gap Type	-0.083210	1.605	0.4482
Level of Embedding	-0.123679	29.497	3.935e-07
Gap Type and Level of Embedding	-0.001913	0	1