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Backgrounded constituents cannot be "extracted" *

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This chapter investigates the hypothesis that most if not all constraints on Long Distance Dependencies (LDD) stem in large part from clashes of information structure properties of the constructions involved. There is growing evidence that processing difficulty is another important factor, although it is argued that processing difficulty does not by itself explain the phenomena.

1. BASIC FACTS

There have been a myriad of attempts to account for constraints on long distance dependencies (LDDs), particularly so-called "island constraints," such as those illustrated in Table 1:

*Who did she see the report that was about? (cf. She saw the report that was about his sister)	Complex NPs (both noun complements and relative clauses)
*Who did that she knew bother him? (cf. That she knew his mother bothered him)	Subjects
??What did she whisper that he left? (cf. She whispered that he left his wallet)	Complements of manner-of-speaking verbs
??What did she leave the movie due to? (cf. She left the movie due to the loud noise.)	Presupposed adjuncts

Table 1: Classic examples of "Island" constraints

The present paper provides evidence that the functions of the constructions involved play a key role in long distance dependency constraints. Traditional accounts of constraints such as those provided in Table 1 have appealed to syntax as an explanation (see section 12). More recently, there has been a resurgence of processing explanations for many types of violations (section 11).

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The present account focuses on the fact that the information structure properties of the constructions involved play a crucial role. That is, each construction in a language is used for particular purposes and not others. For example, the passive serves to topicalize an argument that is not normally a subject and/or to deemphasize the argument that normally *is* the subject. Relative clauses serve to help identify or modify an argument. Argument structure constructions convey who did what to whom, and often constrain which arguments can be topical or focal. *Wh*- questions serve to request information about a particular focused argument or adjunct. These sorts of functions—specifically clashes between functions when constructions are combined to form utterances—are what give rise to constraints on LDDs.

If we consider the island violations in Table 1, it is clear that the judgments in the case of complex NPs and subject islands are more robust, and less dependent on context, than in either of the latter two instances, both of which are marginally acceptable. It turns out that there is a cline of acceptability, at least in certain cases and the information structure account predicts such graded judgments. This is discussed in more depth in section 4.

2. DISCOURSE SENSITIVITY TO ISLANDS

A telling, but largely ignored fact is that certain discourse-level phenomena are sensitive to islands. Let us assume that the answer to (1) is that Shira was wearing a new hat.

1.Why was Shira so happy?

Morgan (1975) long ago observed that none of the replies in (2)-(5) are felicitous answers to the question posed in (1) (cf. also James 1972: for related observations). In each case, the proposition that would answer the question (namely, that she is dating someone new) is expressed within an island. These can be compared with the variants given below each example in (2)-(5) in which the replies are not contained within islands, and are correspondingly felicitous.

Relative clauses are islands to felicitous replies
2.#The woman who thought she was wearing a new hat lives next door.
(cf. The woman who lives next door thought she was wearing a new hat.)

Sentential Subjects are islands to felicitous replies
3.#That she is wearing a hat is likely.
(cf. It's likely that she's wearing a new hat.)

Complements of manner of speaking verbs are islands to felicitous replies
4.#Sam shouted that she was wearing a new hat.
(cf. Sam said she was wearing a new hat.)

Presupposed adverbials are islands to felicitous replies:
5.# Shira earned some money after she bought a new hat.
(cf. Shira earned some money in order to buy a new hat.)

Through Gricean implicatures of relevance, contexts can be found in which the sentences marked as infelicitous above are much improved, interpreted as quite indirect responses to the question in (1). Yet as direct responses to the question posed, each of the responses in (2)-(5) above is markedly odd. Since these island phenomena exist across sentences, indeed, across interlocutors, it strongly raises the possibility that constraints on islands are fundamentally related to INFORMATION STRUCTURE (cf. also Cole et al. 1977).

3. INFORMATION STRUCTURE EXPLANATION

The choice of particular constructions in an utterance determines the information structure of a sentence, including its topic and potential focus domain. In fact, differences in the packaging of information are perhaps the most important reason why languages have alternative ways to say the "same" thing (Allen 1999; Halliday 1967; Lambrecht 1994).

Several researchers have suggested that islands can be explained by observing that the 'extraction site' must be within the potential FOCUS DOMAIN (Erteschik-Shir 1979; Polinsky 1998; Takami 1989; Van Valin 1998). The focus domain of a sentence is that part of a sentence that is interpretable as being asserted. It is thus "one kind of emphasis, that whereby the speaker marks out a part (which may be the whole) of a message block as that which he wishes to be interpreted as informative" Halliday (1967:204). Similarly Lambrecht (1994: 218) defines the focus relation as relating "the pragmatically non-recoverable to the recoverable component of a proposition [thereby creating] a new state of information in the mind of the addressee."

The subject argument is the default TOPIC in the clause (Chafe 1987; Lambrecht 1994; Langacker 1987; MacWhinney 1977). A sentence topic is a "matter of [already established] current interest which a statement is about and with respect to which a proposition is to be interpreted as relevant" (Francis & Michaelis ms: 119). The topic serves to contextualize other elements in the clause (Chafe 1994; Kuno 1972; Langacker 1987; Strawson 1964).

We will refer to elements of a sentence that are neither the primary topic nor part of the focus domain as BACKGROUNDED elements (corresponding roughly to the TAIL of Vallduvi 1993).

✯BACKGROUNDED constituents: constituents that do not correspond either to the primary topic nor part of the potential focus domain.

Following Erteschik-Shir (1979), Takami (1989), and Van Valin (1998), a negation test serves as independent verification that constructions such as those identified in Figure 1 are not part of the potential focus domain. For example, the relative clause in (6) is backgrounded, because the proposition conveyed by it is not part of the focus domain; it is not negated by sentential negation (cf. 7):

6. I read the book that Maya loaned Rachel.

7. I didn't read the book that Maya loaned Rachel.
(Ex. 7 does not negate that Maya loaned Rachel a book).

Of course, backgrounded constituents can be negated with "metalinguistic" negation, signaled by heavy lexical stress on the negated constituent (*I didn't read the book that Maya gave me because she didn't GIVE me any book!*). But then metalinguistic negation can negate anything at all, including intonation, lexical choice, or accent. Modulo this possibility, the backgrounded constituents of a sentence are not part of what is asserted by the sentence.

The relative clause in (6) is not only backgrounded, it is actually presupposed. Not all backgrounded information is presupposed, however, because presuppositions are not only impervious to sentential negation, they are also assumed to be true, and this latter aspect is not a requirement for backgrounded status.

The generalization concerning island status can be stated as follows:

✯ (BCI) Backgrounded constituents cannot be "extracted" in LDD constructions (Backgrounded Constituents are Islands).

This claim entails that only the primary topic in a clause or elements within the potential focus domain are candidates for long-distance dependencies. Notice that elements *within* clausal subjects are backgrounded in that they are not themselves the primary topic, nor are they part of the focus domain.

The restriction on backgrounded constituents is motivated by the function of the constructions involved. The "extracted"

constituent involved in LDD constructions is positioned in a discourse-prominent slot, and it is anomalous to treat an element as at once backgrounded and discourse-prominent.

The definition of backgroundedness implicitly acknowledges the notions of topic and focus are not opposites: both allow for constituents to be interpreted as having a certain degree of discourse prominence (see, e.g. Arnold 1998: for experimental and corpus evidence demonstrating the close relationship between topic and focus). One sentence's focus is often the next sentence's topic. That is, once new material is introduced into the discourse, it is available to persist as a continuing topic during subsequent discourse: i.e., it may have high *topic persistence*. Centering Theory, developed as a computational linguistics tool, captures the relationship between topic and focus very naturally (e.g., Grosz et al., 1983). In the theory, discourse referents in the speaker's focus of attention are called *centers*. All arguments in each utterance are forward-looking centers, which become potential antecedents for referential terms in a subsequent utterance. A special member of the forward-looking centers is called the backward-looking center, corresponding roughly to "topic," in that it indicates what the utterance is "about" and serves to link the utterance to the preceding utterance.

The claim then is that once we recognize that each construction has a function and that constructions are combined to form utterances, constraints on "extraction" arise from a clash of discourse constraints on the constructions involved.

4. THE RELATIVE ISLAND STATUS OF "BRIDGE", MANNER OF SPEAKING AND FACTIVE VERB COMPLEMENTS

We noted in the introduction that judgments of island status are somewhat gradient. We also observed that constructions need not be strictly presupposed in order to be backgrounded. These facts combine to suggest that ill-formedness should be gradient and that degrees of ill-formedness should correspond to degrees of backgroundedness, when other factors related to frequency, plausibility, and complexity are controlled for.

This idea motivated an experimental study of various clausal complements, including "bridge" verbs, manner-of-speaking verbs, and factive verbs (Ambridge and Goldberg 2008). Native speaker judgments were collected on two measures: the degree of acceptability of questioning a constituent within the complement clause, and the degree to which main clause negation was interpreted to imply the negation of the proposition expressed by the complement clause. The latter was how the notion of backgroundedness was operationalized in the study. Sentence

length and complexity were controlled for. The hypothesis was that the degree of acceptability of extraction could correlate inversely with the degree of backgroundedness of the complement clause.

There are well known effects of lexical frequency on acceptability judgments, such that, *ceteris paribus*, sentences with more frequent words tend to be judged as more acceptable (Ambridge et al. 2008; Dabrowska et al. 2009; Ellis 2002; Kempen & Harbusch 2004; Schuetze 1996). There are also recognized effects of lexical bias, such that, for example, if judging sentences with complement clauses, those that involve verbs that more frequently occur with complement clauses can be expected to be rated more highly than utterances involving verbs that occur with complement clauses more rarely (MacDonald et al. 1994; Trueswell et al. 1993; Wasow 2002). To control for these factors, as well as issues related to plausibility, which are orthogonal to possible effects of information structure, we calculated *difference* scores: i.e., we subtracted the acceptability ratings of LDD expressions from acceptability ratings of the same verbs with clausal complements that were presented without LDDs.

The BCI hypothesis predicts that the greater the extent to which sentential negation implies negation of the complement clause, the lesser the extent to which the complement clause is backgrounded, and hence the weaker the island. That is, the higher the negation-test score, the higher the predicted acceptability of the related WH-question, and the lower the difference score. Thus the BCI hypothesis predicts a significant negative correlation between negation-test and difference scores.

Results demonstrated that in fact, as predicted, the mean negation test score was a highly significant (negative) predictor of mean difference score (r = -.83, p = 0.001), accounting for over two thirds of the observed variance (R^2 = 0.69).[11] The correlation of |.83| is strikingly high, and there were no outliers (+/- 2 SD) from the regression line. Results are shown in Figure 1:

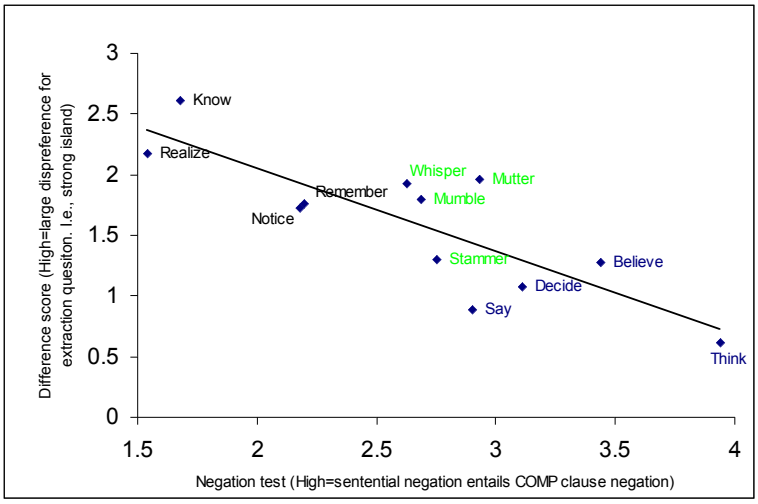

Figure 1: *Correlation between difference scores (dispreference for question scores) and negation test scores (from Ambridge & Goldberg 2008)*

The BCI generalization goes some way toward explaining why the same verbs, "think" and "say," are more likely to appear in long-distance dependency constructions than other verbs cross-linguistically (Dabrowska 2004; Verhagen 2006). Their semantics motivates their use as hedges that are used when the main assertion is in the complement clause (Thompson, 1991). Their discourse properties in turn motivate their distribution. The findings provide strong evidence that backgroundedess—as operationalized by the negation test—predicts the degree of ill-formedness of LDDs involving complement clauses.

5. The Ditransitive Recipient Argument

An often overlooked constraint on LDDs involves the double-object or ditransitive construction. In particular, the recipient argument of the ditransitive resists long-distance dependency relations (Erteschik-Shir 1979; Fillmore 1965; Oehrle 1976):

8.??Who did Chris give the book?
9.??The boy who Mary had already given the key let himself in.

Instead, speakers prefer to question the recipient of the dative paraphrase:

10. Who did Chris give the book to?
11. The boy who Mary had already given the key to let himself in.

This case is a bit different than traditional island constraints, since it is the whole recipient argument that resists extraction, not just elements from within the constituent. And yet, we will see that the constraint against backgrounded constituents being extracted extends to this case.

The judgments are somewhat subtle and have occasionally been dismissed as invalid (Langendoen et al. 1973; Wasow & Arnold 2005). However, they can be confirmed by a variety of measures. Separate surveys collected on Mechanical Turk in both Britain and the US found that 91% of native British speakers (*N*=22) and 89% of native American English speakers (*N*=28) reported that they preferred questions such as (10) over those such as (8) in a forced choice task. This stated preference is remarkable since there is a prescriptive injunction against stranding prepositions. The dispreference has also been confirmed by a corpus search that demonstrated that questions involving the recipient of the prepositional dative (e.g., 10) outnumbered questions involving the recipient argument of ditransitives (e.g., 8) 40 to 1 (Goldberg 2006). In the latter study, only three questioned recipients of a ditransitive were identified in the first 120 distinct examples returned on a Google search.[1] These facts hold despite the fact that *give* has a strong lexical bias in favor of the ditransitive construction (Wasow 2002)

Thus the skewing of the data towards questioning the recipient of the prepositional paraphrase is quite real. The dispreference against LDDs that involve the ditransitive recipient is, moreover, not likely simply a quirk of English, because a parallel dispreference has been observed in certain Bantu languages, including Chichewa and Kinyarwanda (Bresnan & Moshi 1990).

Intriguingly, the recipient argument of the ditransitive construction has been argued to be a secondary topic: it is overwhelmingly animate and given in discourse (Dryer 1986; Givón 1979; 1984; Goldberg 2006; Langacker 1987; Van Hoek 1995). Whether it is nonetheless part of the focus domain is somewhat debatable. In favor of its backgrounded status is the fact that it is not within the scope of non-contrastive clausal negation when the recipient is pronominal, as it usually is (cf. also the "lie" test of Erteschik-Shir 1979):

12.#She didn't give her the book, she gave it to Pam.

But it is somewhat easier to negate a lexical NP such as a proper name without special intonation:

13. She didn't give Chrystal the book; she gave it to Pam.

The prepositional dative argument, on the other hand, is readily interpreted as part of the focus domain without contrastive stress, even when it is pronominal:

14.She didn't give the book to her, she gave it to Pam.

We have already seen that backgroundedness is a gradient notion (section 4). We can understand these facts to imply that the recipient of ditransitives is backgrounded to some extent: less than elements within, say, a relative clause but more than the recipient argument of the prepositional dative. In this way we can predict that LDDs involving the recipient argument are dispreferred, but are not as unacceptable as LDDs involving more strongly backgrounded constituents.

It may be that the dispreference in English of questioning the active recipient argument of a ditransitive is manifest in part because there exists a better-suited alternative, namely the dative construction. That is, if one wishes to make a recipient argument discourse-prominent as in a LDD, the prepositional dative is a handy alternative. Cross-linguistic work is needed to determine whether all languages treat secondary topics as backgrounded, or whether the existence of an alternative construction plays a critical role.

An advantage of the information structure account of the English data is that it allows us explain the fact that the ditransitive recipient argument can be freely questioned or relativized if it is already the subject of a passive:

15.Who was given the book?

16.The boy who was given the key let himself in.

That is, if the recipient argument is a subject (via passivization), then it is free to be involved in LDD relations that are otherwise only marginal. This makes sense since passivized recipients are the primary topics in a clause, and primary topics are not backgrounded.

6. LIGHT VERB COMPLEMENTS

As soon as the "complex NP" constraint was proposed (see Table 1), it was recognized to have certain exceptions. Ross (1967/1986: 85) noted the following type of contrasts[2] (Ross's judgments provided):

[2] Examples updated slightly to adjust for inflation.

17.The funds that I have hopes the bank will squander amount to more than a billion.
18.?The funds that I am making the claim the bank will squander amount to more than a billion.
19.*The funds that I am discussing the claim the bank will squander amount to more than a billion.

The standard account of examples such as (17) and (18) is to argue that the light verb + complements such as *have hopes* or *make a claim* are "underlyingly" simple verbs *hope* and *claim* and therefore, at some level, equivalent to the following examples which are expected to be acceptable (see section 4):

20.The funds I hope the bank will squander amount to more than a billion.
21.The funds that I am claiming the company will squander amount to more than a billion.

However, we find the same effect with *have a hunch* involving a LDD out of a complex NP, and yet in this case there exists no verbal counterpart:

22.The funds that I have a hunch the bank will squander amount to more than a billion.

The BCI proposal accounts for the unexpected relative acceptability of examples such as (17), (18) and (22) straightforwardly since the nominal complements are only weakly backgrounded. This is confirmed by the negation test:

23. I don't have a hunch the bank will squander funds that amount to more than a billion.
24. I don't have hopes the bank will squander funds that amount to more than a billion.
25. I'm not making the claim the bank will squander funds that amount to more than a billion.

In each case, the main clause negation (weakly) negates the proposition expressed in the complement: that the bank will squander funds that amount to more than a billion. Moreover, conversely, as predicted, main clause negation of example (19) does *not* negate the proposition of the lower clause:

26. I'm not discussing the claim the bank will squander funds that amount to more than a billion.

Instead, the sentence negation in (26) is understood to negate the main clause only, namely that the speaker is not discussing the claim. Thus these cases involving relatively acceptable LDDs involving "light" verbs together with certain complex NPs are explicable on the basis of their information structure properties.

7. PICTURE NOUNS

There are well-known facts about so-called "picture nouns" that are directly addressed by the information structure account, including the fact that they tend to be islands only if they are definite (once again, these cases were noticed already by Ross 1967/1986).

27.a. Who did she see a report about?
b. ??Who did she see the/John's report about?

28.a. Who did she take a picture of?
b. ??Who did she take the/John's picture of?

Reduced relative clauses with indefinite head nouns are *not* necessarily backgrounded, as revealed by the negation test, even without special focus intonation:

29.She didn't see a report about John. (It was Sheila she read a report about.)
30. She didn't take a picture of Hana. (It was Sara she took a picture of.)

At the same time, *definite* picture NPs as in (31) are *not* negated by sentential negation, without the intonation contour characteristic of metalinguistic negation. As predicted, then, LDDs are unacceptable (31b):

31a. She didn't take Shira's picture of Hana. (cannot deny that Shira has a picture of Hana without metalinguistic accent on *Hana*)
b. ??Who did she take Shira's picture of?

Also, certain predicates interact with picture nouns in the predicted way:

32a. They didn't destroy more pictures of Shira. (does not deny that more pictures of Shira exist, but only that they did not destroy them.)
b. ??Who did they destroy more pictures of?

Thus arguments of picture nouns are sometimes islands to long-distance dependency relations and sometimes not (see Deane

1991 for further discussion of such cases). When they are not islands, they can be independently demonstrated to be part of the potential focus domain and therefore not backgrounded.

8. COORDINATE STRUCTURE CONSTRAINT

The coordinate structure constraint was intended to require that any LDDs from a conjunction involve "across-the-board movement" such that the same constituent from each conjunct is involved. The constraint was based on the following sorts of contrasts:

31.*Who did he kiss Pat and hug?
32.Who did he kiss and hug?

Hofmeister and Sag (2010: 368) propose that processing factors underlie most island effects, but they suggest that the coordinate structure constraint is simply syntactic. And yet, Ross (1967/1986: 105) observed the following sorts of counterexamples (cf. also Culicover & Jackendoff 1997; Deane 1991; Lakoff 1986):

33.Here's the milk that I just ran to the store and bought. (Ross 1967/1986)
34.Which book has he gone and ruined now?
35.The paper that I've got to try and find examines the coordinate structure constraint in great detail.
36.Who did he grab his pen and write to? (Lakoff 1986)
37.How much can you drink and still stay sober? (Lakoff 1986)
38.Who did he go berserk and start shooting at? (Deane 1991:24)

Relevantly, Lakoff (1986) notes that the conjuncts that are "background states" are the ones that do not involve extraction. Even more to the point, Deane (1991) argued that extraction occurs only from the main event conjuncts because only they are focal information. In fact, without special intonation, we can see that sentence negation implies that the (second) phrase, which is eligible for LDDs, is negated.

39. I didn't just run to the store and buy milk. (I bought a week's worth of groceries).
40. He hasn't gone and ruined this book yet (but give him time).
41. I don't have to try and find a paper that examines the coordinate structure constraint in great detail (because I already found a book).
42.He didn't just grab a pen and write to his mother (although I tried to convince him to contact her).
43. He can't drink two beers and still stay sober. (Two beers make him drunk).

44.He didn't go berserk and start shooting at people. (He only threw a few punches).

Lakoff (1986) further observed that that there is evidence that the conjunction involved is true conjunction on the basis of the fact that the LDD can involve multiple conjuncts, even while it is not operative across-the board. For example, in the following, *what* corresponds to a gap in the second and third and fifth conjuncts but not the first or fourth. It is not clear how these phrases could be analyzed other than as conjuncts. As with conjunction generally, such sentences are pronounced with regular comma intonation between each conjunct:

45. What did he go to the store, buy, load in his car, drive home and unload? (Lakoff 1986)

We therefore find once again that island status is sensitive to information structure properties: only elements that are not backgrounded are candidates for extraction.

9. INFLUENCES OF CONTEXT

In certain cases, such as the bridge verb complements discussed in section 4, the semantics of certain lexical items influences the information structure status of the construction. If manner of speaking verbs are used in discourse contexts in which the particular manner has already been given in the discourse, then we should expect that the complement clause would become part of the focus domain and therefore be eligible for extraction. Kothari (2008) has demonstrated experimentally that this is the case. In particular, reading times involving extraction from complement clauses were reduced significantly in the following sorts of contexts, and were in fact indistinguishable from the same sorts of sentences involving "bridge" verbs such as *say*.

46. The students spoke unintelligibly, managing to convey that the party was a lot of fun. The residential fellow overheard *what the freshman mumbled that he had drunk at the party*.

Quite similarly, it has long been noted that context can affect the acceptability of LDDs involving picture NPs as well. The following example comes from Kuno (1987):

47. Speaker A: After chairman Mao died, they started taking pictures of Committee members off the walls.

Speaker B: Who did they destroy more pictures of, Chairman Mao or Jiang Qing?

In both cases, the context sets up the predicate as being discourse-given and not part of what is asserted by the utterances that contains the LDD. Because every utterance contains an information focus, the complement clause in the case of (48) or the picture NP in the case of (49) are understood to be part of the focus domain, and they are in that case not islands.

10. SUMMARY OF BCI

To summarize, we have reviewed how the claim in ✯, namely that Backgrounded constituents cannot be "extracted" (BCI) motivates the following generalizations:

1. Subjects, presupposed adjuncts, complex NPs are generally islands.
2. Felicitous replies are sensitive to islands.
3. Grammaticality judgments of long-distance dependencies involving clausal complements of bridge, manner-of speaking and factive verb clausal complements correlate with the degree of "backgroundedness."
4. The active recipient argument of ditransitive, as a secondary topic, resists extraction, while the passive recipient argument of a ditransitive, as a primary topic, is free be extracted.
5. Certain combinations of light verbs with complex NPs only weakly background the clausal complement; in this case, LDDs involving constituents from the complement are (marginally) acceptable.
6. Reduced relative clauses that are within the focus domain (e.g., "picture NPs") are not islands; those that are not within the focus domain are islands.
7. The coordinate structure constraint can be violated when the conjuncts differ in terms of their background status. I.e., conjuncts that are backgrounded are islands, while asserted conjuncts are not islands.
8. Discourse contexts that encourages normally backgrounded elements to be construed to be part of the focal domain mitigate the usual constraints on LDDs.

Other cases and implications of the information structure account are discussed in Goldberg (2006: 129-165). Let us consider how processing or syntactic accounts fare in accounting for the data discussed so far.

11. PROCESSING ACCOUNTS.

Long-distance dependency constructions clearly involve higher processing demands since they require that an argument be kept in working memory while its role in the sentence is identified further downstream (Just & Carpenter 1980). Processing accounts make several independently motivated predictions that have been borne out experimentally:

1) All other things being equal, longer distance dependencies are less acceptable than shorter distance dependencies (Arnon et al. 2005; Gibson 2000; Hawkins 2004).
2) Names are harder to process than definite pronouns, due to differences in relative accessibility (Kluender 1998; Warren & Gibson 2002).
3) Intervening definite NPs are harder to process than indefinites since the latter do not require cognitive search (Warren & Gibson 2002).
4) More complex or specified fillers are harder to process initially but are more easily recalled as required at the gap (Cinque 1990; Deane 1991; Hofmeiser & Sag 2010; Kluender 1998; Kuno 1976; Rizzi 1982a).

Each of these effects has been verified both by linguistic judgments and by experimental manipulations of the sort that are known to correlate with processing demands, e.g., reading times or ERP measures (cf. also Ellefson & Christiansen 2000; Kluender & Kutas 1993a).

At the same time, constraints on working memory do not explain why answers within backgrounded constructions make for infelicitous replies to questions, since the working memory required to understand another person's utterance should be the same regardless of what sort of reply is warranted. Neither do constraints on working memory account for the strong correlation between judgments on LDDs involving various types of verb complements and the negation test used to operationalize the notion of "backgroundedness." This is particularly true given that Ambridge and Goldberg (2008) controlled for frequency and lexical bias, which could ultimately be chalked up to processing factors. In addition, we saw that the ditransitive recipient argument is a main clause argument, arguably sister to the verb; thus it would be far-fetched to claim that its resistance to extraction is due to processing difficulty. Finally, the semantic and pragmatic effects we saw in the discussion of light verbs' NP complements, picture NPs, and context effects are likewise more naturally attributable to information packaging than to general processing difficulty.

Of course, whether processing constraints can be used as a general umbrella for both demands on working memory and clashes of information structure properties of the constructions involved depends in part on what is meant by "processing." Deane (1991) relates the information structure account and the processing account by appeal to *attention*. He notes: "Long-range extraction requires that the language user relate two widely separated portions of the sentence. This process can only take place if both portions can be attended to simultaneously" (1991:4). At the least, it is necessary to recognize that different constructions, contexts, and lexical semantic choices give rise to different degrees of backgrounding (or lack of attention) of various constituents.

Alternatively we can recognize that a *combination* of information structure constraints and processing factors related to working memory are needed to provide an adequate account of island constraints (cf. Goldberg 2006).

12. PURELY SYNTACTIC ACCOUNTS

Since Chomsky (1963), the dominant view has been that constraints on filler-gap constructions arise from the particular hierarchical syntactic configuration involved. Such an account faces problems, however, when the relevant syntactic configurations are the same and yet the island status differs (cf. also Hofmeiser and Sag 2010). We have already seen this is the case in several instances. For example, complex NPs are usually islands but they are not in certain cases involving light verbs (section 6). Definite and indefinite determiners are not thought to differ syntactically and yet we have seen that they have different effects on LDDs involving picture nouns (section 7). Coordinate structures generally only allow across-the-board extraction out of all conjuncts, but we saw that there were violations of this generalization when one conjunct was asserted and the other was backgrounded (section 8).

The natural solution for a syntactic account is to argue that the syntactic structures involved in minimal pairs are not actually the same. Let us consider one case in particular, the case of complement clauses of various main verbs, to see the sort of difficulties that syntactic accounts face. Consider the following minimal pairs:

48. Who did she think that he saw _?
49. ??Who did she mumble that he saw_?
50. ??Who did she realize that he saw_?

We have already seen that judgments on "bridge" verbs (e.g, 50), manner of speaking verbs (e.g., 51) and factive verbs (e.g., 52) tightly correlate with the degree to which their complement clauses are backgrounded (section 4; Ambridge & Goldberg 2008). There is no reason to expect such a correlation unless information structure is taken into account.

But let us leave this fact aside, and try to simply account for the fact that bridge verb complements are non-islands while manner of speaking and factive verbs are islands (cf. also Ambridge & Goldberg 2008). It has been suggested that the complements of manner of speaking verbs are adjuncts, not arguments (Baltin 1982); as adjuncts they could be expected to be islands. This adjunct proposal is supported by the fact that the clausal complement is optional:

51. She shouted that he left.
52. She shouted.

However, clausal complement clauses are restricted to appear with a fairly narrow set of verbs including verbs of saying and thinking; this restrictiveness is a hallmark of arguments, not adjuncts. Moreover, (52) does not convey the same general meaning as (51) insofar as only (51) implies that propositional content was conveyed; the change of basic meaning when omitted is another hallmark of arguments. In addition, direct object arguments can replace clausal complements (e.g, 53), and yet it would be highly unusual to treat a direct object as an adjunct:

53. She shouted (the remark).

Finally, the possibility of treating the complement clause as an adjunct clearly does not extend to factive verbs, since their clausal complements are not generally optional (cf. 54-55).

54. She realized that he left.
55. ??She realized.

Kiparsky and Kiparsky (1971) suggest a different solution to account for the island status of clausal complements of factive verbs. They suggest that factive clausal complements contain a silent *the fact* rendering the clausal complements part of a complex NP (as in 58).

56. She realized *the fact* that he left.

This analysis predicts that the complement clauses of factive verbs should behave just like NP complements, since expressions such as (57) and (58) would be structurally identical:

57. *Who did she realize the fact that he saw?
58. ??Who did she realize that he saw?

Intuitively, however, (57) is less acceptable than (58). Moreover, positing a silent *the fact* phrase to account for the ill-formedness of examples like (58) is ad hoc unless a principled reason can be provided for *not* positing a silent NP (e.g., *the idea*) in the case of bridge verbs, which readily allow extraction (cf. 59-60).

59. *Who did she believe the idea that he saw?
60. Who did she believe he saw?

To summarize, if, in fact, the syntax is the same and only the lexical semantics differs, a structural account does not predict variation in judgments across different verb classes. The complement clauses must be reanalyzed as either adjuncts or parts of complex NPs (to my knowledge, it has not been proposed that they could be subjects, but that would be the other option), but each of these possibilities raises issues that would need to be addressed for the proposed alternative analyses to be convincing. In addition, the fact that judgments on clausal complements are gradient and correlate strongly with judgments on the negation test is completely unexpected on the syntactic account.

Finally, neither the facts about felicitous replies, the ditransitive recipient argument, light verbs plus complex NPs, picture NPs, nor coordinate structures are accounted for either. Each of these facts would require additional differences in "underlying" structures.

12. Conclusion

Utterances involving LDDs involve the combination of a LDD construction with some other construction. The combined constructions each have particular information structure properties, and those properties must be consistent in order to avoid a clash that can result in varying degrees of illformedness. In particular, speakers avoid combining constructions that would place conflicting constraints on a constituent, such as requiring it to be at once backgrounded *and* discourse-prominent. This single, general constraint on the way information structures of individual constructions can combine accounts for a myriad of facts. Moreover, it is an instance of the very general prohibition against

combining constructions that individually contain specifications that cannot be reconciled (Croft 2001; Goldberg 2006).

A network of LDD constructions specifies the surface form and function of, for example, questions, relative clauses, and topicalization constructions. Clearly, construction-specific constraints on these constructions are required (Croft 2001; Sag 2010). But generalizations across LDD constructions are captured by recognizing the principle in ✯: Backgrounded constituents cannot be "extracted" in LDD constructions.

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[1] The three attested instances of questioned recipients of ditransitives we found are provided below. Two of these involved particularly long theme phrases, strongly motivating the use of the ditransitive (Wasow 2002).

i. When Julia left the Valley, who did she give control of her interest in Falcon Crest?

ii. In Paul's report to James and to the elders, who did he give credit for the work among the Gentiles?

iii. Jack: Yes, but who did she give the eye? ☺

Example iii involves an idiomatic phrase to give someone the eye, “to look seductively at someone”. The expression with to (She gave an eye to him) only has a literal interpretation.