

Rethinking scope islands¹

Chris Barker, *New York University Linguistics*

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Abstract

According to long-standing wisdom, relative clauses and tensed clauses are supposed to be *scope islands*, which means that a scope-taker inside the clause shouldn’t be able to undergo Quantifier Raising (QR) in order to take scope outside of the clause. However, it is easy to find abundant systematic naturally-occurring counterexamples. Therefore we need to rethink scope islands, both theoretically and empirically. Theoretically, many semantic analyses of specific phenomena have rejected a QR solution on the assumption that QR is clause bounded, proposing instead various non-QR scoping methods (choice functions, sets of alternatives, etc.). These proposals create what I call the *exceptional scope conspiracy*: by and large, they provide denotations that could have been delivered by QR. So if QR is not clause bounded after all, we should reconsider QR as a viable approach to handling these phenomena. Empirically, the picture is more intricate than previously appreciated: scope islands must be sensitive both to the identity of the scope-taker and to the identity of the predicate embedding the island. However, the interaction of scope islands with scope takers is not unconstrained. I propose the *scope island subset principle*: given two scope islands, the set of scope-takers that can’t escape one will be a subset of the scope-takers that can’t escape the other. I formalize this hypothesis using a new, simple but flexible technique for encoding and enforcing scope islands.

1 Introduction

A **SCOPE ISLAND** is a syntactic context that traps a scope-taker inside of it.

- (1) Someone asked everyone to leave. [multiple askers: ok]
- (2) Someone thought everyone left. [multiple thinkers: *]

The consensus in the literature is that inverse scope for (1) is possible, in which case there can be a different asker for each person who was asked to leave, but not for (2), which entails the existence only of one thinker and one thought. The difference is supposed to be that the embedded clause in (1) is untensed, but the embedded clause in (2) is tensed. The general assumption is that the tensed clause is a scope island that traps the scope-taker *everyone* inside of it, as illustrated in Figure 1.

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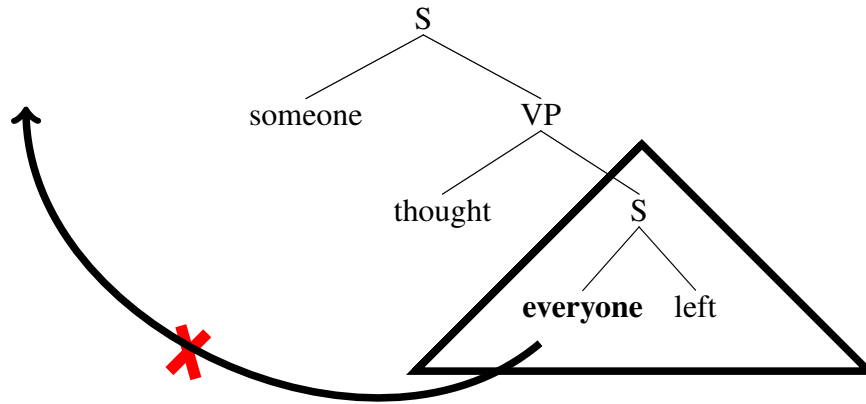


Figure 1: A scope island. The scope-taker *everyone* is unable to take scope outside of the clausal complement of *think*.

Although I don't dispute the standard judgments as just described, I will argue that clauses are not in general scope islands for Quantifier Raising, regardless of whether they are tensed clauses or relative clauses. I will argue that a more accurate picture requires a more fine-grained approach that is sensitive both to the identity of the embedding predicate, as well as to the identity of the scope-taker in question. The data in (1) and (2) show only that the complement of *think* traps *everyone*, not that clauses in general are scope islands for all scope-takers.

Islands of any sort, whether syntactic islands or scope islands, have considerable intrinsic theoretical interest. But in addition, a number of consequential decisions about how to analyze major semantic phenomena have been based on the assumption that QR is clause bounded. Notable examples include the computation of focus, the semantics of indefinites, functional relative clauses, and more. If QR is not clause bounded, we need to reconsider the role of QR in the analysis of these phenomena.

As a first step towards a more nuanced theory of scope islands, I will propose a simple but flexible formal system that will encode and enforce scope islands.

2 Challenging the standard wisdom

In this section I will present data—some old, some new—that neither relative clauses nor tensed clauses are scope islands. The presence of a scope island depends instead on the identity of the clause-embedding predicate: some predicates create scope islands, and some do not.

2.1 The beautiful idea

Rodman 1976 discusses the following two examples:

- (3) John has dated a woman who loves every man. $*\forall > \exists$
 (4) Guinevere has a bone that is in every corner of the house. $*\forall > \exists$

On the basis of (only) these two sentences, he declares that “In a relative clause the element that is relativized always has wider scope than any other element in that relative clause”—in other words, that relative clauses are scope islands. He then shows how a modification of Montague’s 1973 PTQ fragment could enforce relative clauses as a scope island. He points out that the modification also makes relative clauses syntactic islands, which he considers a good result.

Chomsky 1975 challenges the accuracy of Rodman’s empirical generalization.

- (5) John said that everyone had left. $*\forall > \text{said}$

Based on the observation that (5) resists inverse scope, Chomsky suggests that clauses, plain and simple, are scope islands, not relative clauses in particular. Given that relativization ignores clause boundaries (e.g., in *the man that [Ann said [Bill liked _]]*, the relativization crosses two clause boundaries), Chomsky concludes, contrary to Rodman, that with regards to scope islands and relativization, “very different principles are at work.”

In his 1977 dissertation, May explores Chomsky’s suggestion that clauses in general, and not just relative clauses, are scope islands. However, May endorses Rodman’s idea that syntactic and semantic constraints could turn out to be a single set of constraints (May 1977, p. 2):

[I] propose a rule, QR, which generates representations at Logical Form for sentences containing quantifiers. Well-formedness of representations at this level is determined by universal principles on the output of the rules of core grammars; specifically, the Predication Condition, the Condition on Quantifier Binding and the Subjacency Condition are all argued to be general conditions on well-formed representations at Logical Form... [I]t follows from the Subjacency Condition that quantification is clause bounded, in the unmarked case.

Subjacency says that (overt) syntactic movement cannot cross more than one bounding node, where at least S is a bounding node. On May’s 1977:172 analysis:

- (6) $[_{S_2} \text{John hissed } [_{\bar{S}} \text{that } [_{S_1} \text{Smith liked } [_{NP} [_Q \text{every painting}]]]]]$

In order for the universal to take scope over the matrix clause via QR, it must cross two S nodes, which would violate Subjacency. It follows that if we assume that QR obeys constraints on syntactic movement, we predict that clauses are always scope islands.

This beautiful idea—that constraints on semantic scope and syntactic movement could flow from a single source—took a powerful hold on the imaginations of a generation of semanticists. The idea is clearly articulated in recent handbook articles. Ruys and Winter 2011 write that “evidence for QR exists to the extent that generalizations on quantifier scope can be stated in terms of syntactic properties of the relevant constructions, and to the extent that these generalizations apply to other purported movement operations as well. Ultimately, on the QR approach, a unified theory explaining properties of both overt and covert movement should be possible.” Likewise, Dayal 2012 writes that “Conceiving of Quantifier Raising as a syntactic rule provides a general explanation for some of the restrictions on quantifier scope... [W]hatever principles of syntax rule out the formation of overt dependencies in these constructions can be tapped to rule out the creation of problematic covert dependencies at LF.”

Variations on the basic idea have been proposed. To mention just two notable examples, Huang 1982 argues that Subjacency does not apply to QR, but the ECP does, a position later taken up by May 1985:29. Cecchetto 2004 proposes that it is syntactic phases that create scope islands.

Of course, given the assumption that clauses are scope islands, one inconvenient fact for the beautiful idea is that clauses are typically not syntactic islands; they certainly are not in English. So any correspondence between syntactic islands and scope islands would have to be imperfect at best.

Since relative clauses are among the strongest syntactic islands cross linguistically, the belief that relative clauses are scope islands was consistent with the idea that syntactic islands and scope islands arise through general constraints on movement. But unfortunately for the beautiful idea, as we will see immediately below, relative clauses are not scope islands.

Despite the immediate and sustained popularity of the hypothesis, there were dissenting views. Farkas 1981 argues that QR ignores syntactic islands, and Huang’s 1982 dissertation showed that in-situ *wh* in Mandarin scopes out of syntactic islands. In both of these cases, covert scope-taking clearly did not behave like overt syntactic movement.

Despite sporadic evidence in the literature to the contrary (which I will review), I take it that it is currently widely believed that QR is subject to some kind of clause boundedness. Therefore it is worthwhile to build a careful case that neither relative clauses nor tensed clauses are scope islands.

2.2 Relative Clauses are not scope islands

The literature contains a number of counterexamples to the claim that relative clauses are not scope islands.

May 1977:223 himself offers a sentence that he considers to be an exception to the

claim:

- (7) A book [which every prisoner left] surprised the warden.

Here and in the next few examples, I've surrounded the relative clause in question in square brackets. According to May, the universal can scope over the indefinite.

- (8) The woman [that every man hugged] pinched him.

Sharvit observes that this sentence has an interpretation on which the universal appears to take wide scope and bind the pronoun. (I'll return to Sharvit's analysis below in section 3.4.)

- (9) The picture of himself [that everyone sent in] annoyed the teacher.

Based on examples like this one, Hulse and Sauerland 2006 declare that "relative clauses are not scope islands."

Finally, Szabolcsi 2010:107 offers the following counterexample:

- (10) ^γA timeline poster should list the different ages/periods (Triassic, Jurassic, etc.) and some of the dinosaurs or other animals/bacteria [that lived in each].

Here and throughout I'll use ^γ to indicate a naturally-occurring example. The context clearly expects that there will be a different list of dinosaurs for each period covered by the timeline, i.e., in which *each* takes scope over *some*.

In addition to these examples from the literature, it is easy to find as many naturally-occurring counterexamples as desired. Here are some:

- (11) ^γThe data set represents the number of snails [that each person counted on a walk after a rainstorm]. 12, 13, 22, 16, 6, 10, 13, 14, 12
- (12) ^γThe papers are all laid out by alphabetical order, so you can see the grade [that every person got].
- (13) ^γWhat is the absolute earliest [that each character can die]?
- (14) ^γClassroom time and content vary based on the job [that each person does].
- (15) ^γFor the experiment, measure the time [that each person took to travel 20 meters].
- (16) ^γ[T]here is a role [that each person is uniquely designed by God to fulfill].
- (17) ^γInclude the name of the person [that each volunteer must report to].
- (18) ^γAsk for the complete name of the insurance company [that will issue each policy].
- (19) ^γGive the name [that corresponds to each abbreviation]: (a) GTP; (b) dCDP; (c) dTTP; (d) UDP.

- (20) ⁷Yet at the time [that we devised each plan], we were confident it would succeed.
- (21) ⁷Reflecting and thinking about all of this, we separate the word [that most represents each sign of the zodiac].
- (22) ⁷The following diagram sets out the stages, and the main events [that occur in each stage].
- (23) ⁷Note that the superscripts displayed are the changes [that occur to each bit when borrowing].

In each example, I've indicated the extent of the relative clause with square brackets. All of these examples allow interpretations on which the universal can take scope outside of the relative clause. In several of these examples, it is clear that the intended interpretation requires the universal to take wide scope. Note that in the last six examples, the quantifier is not in subject position.

I take it that these examples illustrate that relative clauses are not in general scope islands, at the very least not for *each*, and to a lesser extent for *every*.

If relative clauses are not scope islands, what accounts for Rodman's examples, repeated here?

- (24) John has dated **a woman** who loves every man.
- (25) Guinevere has **a bone** that is in every corner of the house.

Note that in both of these examples, the head nouns are indefinite. When relative clauses modify singular count nouns, they provide a property that identifies a unique element of the set denoted by the head noun. Therefore we expect the determiner to be definite, not indefinite. So the wide scope reading in these examples is working against Maximize Presupposition. This is presumably why many—though not all—of the examples in (11) through (23) involve the definite determiner.

In addition, Rodman's examples involve *every*. It is well known that *each* is a stronger island escaper, so if we want to test whether relative clauses are islands, we should test with *each*.

Putting these considerations together, we can attempt to construct an example that favors the wide scope reading even with an indefinite determiner:

- (26) As part of the usual painstaking security clearance background investigation, FBI agents tracked down and interviewed at least one woman [who had dated each man].

The context favors a scenario in which there are multiple women per man. To the extent that this example at least makes an inverse scope easier to access, it supports the hypothesis that an explanation for Rodman's examples does not require that relative clauses are scope islands.

More research is needed to understand the factors that are at play in Rodman’s examples. But in any case, what matters here is whether there are *any* quantifiers that systematically scope out of relative clauses—and, as we have seen, there clearly are.

2.3 Tensed clauses are not scope islands

Just as for relative clauses, the literature reports a number of counterexamples to the claim that tensed clauses are scope islands.

- (27) Ann is taller than every professor is. $\forall x.\mathbf{taller}(\mathbf{ann})(x)$

Von Stechow 1984 and Larson 1988 each notice that universals embedded in tensed clauses in comparative clauses can take scope over the clause in which they are embedded, as indicated by the logical paraphrase of (27).

- (28) I know who made each dish. $\forall x.\mathbf{know}(\lambda y.\mathbf{made}(y)(x))(\mathbf{speaker})$

Moltmann and Szabolcsi 1994 observe that the truth conditions of sentences like (28) are equivalent to the universal taking wide scope over the embedded interrogative, as shown, though they provide an analysis that does not involve the universal undergoing QR. Their analysis is discussed below in section 3.5.

- (29) In general, a guide ensures that [every tour to the Louvre is fun].

Fox and Sauerland 1996 observe that the universal appears to scope out of the embedded clause. They suggest that this is an illusion, that the quantification comes from the generic operator. A number of scholars have challenged their claim that a generic interpretation is essential. See Dayal 2012 for a detailed discussion.

- (30) A student made sure that [every invited speaker had a ride].

Farkas and Giannakidou 1996 offer (30) as a counterexample to Fox and Sauerland’s claim in which the universal scopes over the matrix indefinite despite no hint of genericity.

- (31) Determine whether [each number in the list is even or odd].

Finally, Szabolcsi 2010:107 offers a number of examples similar to (31) which motivate her assessment that the scope of universal quantifiers “is not always clause-bounded: *each NP* supplies solid counterexamples.”

And of course, in all of the relative clause examples above, the relevant scope taker is within a tensed clause.

Additional naturally-occurring examples of universals scoping out of tensed clauses are easy to find.

Before and after:

- (32) Someone needs to clean the room after each guest has left.
- (33) ⁷After [each person had been taken], we heard a shot—one for each.
- (34) ⁷After [each person had eaten], they had a spot of kunkumam (colored powder) placed on their foreheads.
- (35) ⁷Henceforth you will see a draw method call after [each object is created]
- (36) ⁷[B]efore [each person had a turn doing the DB thrusters], that person had to do a farmer's carry of 40 meters
- (37) ⁷After [each person had a turn of leading the horse, they were given a debrief on their communication style which ranged from bored, quiet, ...
- (38) ⁷after [each person had written down his opinion on an issue] he was handed back a slip of paper presumably containing a tabulation of the opinions in the group

When:

- (39) ⁷When [each person had finished his turn at shoveling], he placed the spade back into what remained of the mound.
- (40) ⁷When [each person finishes], thank them for sharing. Take a few seconds to pause in silence before the next person shares.
- (41) ⁷When [each person finishes filling out the form], they should place it back on a table and remain or leave the space.
- (42) ⁷When [each person finishes speaking], they pass the football to someone else.

Unless:

- (43) ⁷Unless [each person thinks that the others will cooperate], he himself will not.
- (44) ⁷Unless [each person communicates their needs], the other family members aren't likely to help them satisfy ...

Make sure/ensure:

- (45) A student made sure that [every invited speaker had a ride]
== Farkas and Giannakidou's (30) above
- (46) ⁷But someone has to make sure that [each actor has what is needed at the time it is needed].
- (47) ⁷On a global scale, someone has to make sure that [each application, when introduced, doesn't send ... shock waves through the economy].
- (48) ⁷Someone needs to make sure that [each incoming report or complaint of abuse is actually being investigated].

- (49) ?Someone should ensure that [each tool has been returned to its proper storage location]...
- (50) ?Once the responsibilities are clarified, someone should make sure that [each group is doing what it is supposed to do].

The last set of counterexample is particularly revealing, since they involve verbs that take a tensed clause complement.

Given the number and the variety of counterexamples, I conclude that tensed clauses are not in general scope islands.

So what explains the examples motivating the belief that Quantifier Raising is clause bounded? Here is May's 1977:171 entire data set motivating the claim that QR is clause bounded:

- (51) Jones hissed that Smith liked every painting in the Metropolitan.
- (52) John quoted Bill as saying that someone had left.
- (53) His mother said loudly that everyone had to go.
- (54) Susan didn't forget that many people had refused to contribute.
- (55) Helen grieved that each of the monkeys had been experimented upon.
- (56) It is instructive for someone to play the piece first.
- (57) It's impossible for The Kid to fight a contender.
- (58) It's false that all the men left the party.
- (59) John asked whether he had bought some shuttlecocks at Abercrombie's.
- (60) Carol wondered why everyone was reading *Gravity's Rainbow*.
- (61) Mark regretted Sam's having invited so few people.

It has been well-known since the early 1980's that the scope of indefinites is not clause bounded, so we can disregard (52), (54), (56), (57), and (59). The literature on pair-list readings argues that universals can in effect scope over wh-questions, which allows us to also set aside (60).

The remaining predicates are all attitude verbs or verbs of communication: *hiss*, *say*, *grieve that*, *regret*, and (arguably) *be false*. This suggests an alternative hypothesis: the complement of attitude verbs is a scope island for *every* and *each*. The prediction is that if we can find a clause-embedding verb that is not an attitude verb, it might potentially allow universals inside of its complement to scope out. And this is exactly what we found above for *ensure* and *make sure*.

This hypothesis is offered tentatively, and requires additional research to refine and confirm. But in any case, what matters here is whether there are *any* situations in which universals scope out of a tensed clause—and we have seen abundant evidence that there are.

So here’s what the evidence so far shows: universal quantifiers can systematically scope out of clauses, including relative clauses and tensed clauses. It follows that clauses as a class are not scope islands. Furthermore, it is clear that whether a universal can scope out of a clause depends on the embedding predicate: if the embedding predicate is *think*, it cannot, but if the embedding predicate is *make sure*, it can. Therefore any adequate theory of scope islands must allow scope islands to be created on a per-predicate basis.

3 The “exceptional scope” conspiracy

A scope-taker taking scope outside of its local clause is often said to take “exceptional” scope. This terminology assumes that Quantifier Raising is clause bounded, so if some scope-taker takes scope outside of its local clause, it must do so via some mechanism other than QR.

Important design decisions about the architecture of the grammar have been made at least partly in order to respect the supposed islandhood of clauses. Notable examples include the compositional computation of focus constructions, the semantic contribution of indefinites, functional relative clauses, pair list readings, and more. Once we recognize that clauses are *not* islands, we must re-examine these decisions. In particular, if clauses are not scope islands, then QR is not scope bounded, and we should reconsider whether QR might provide an adequate account of some of the phenomena that have received non-QR treatments.

In other words, I’m suggesting that non-QR scoping mechanisms conform to the following generalization:

The “Exceptional Scope” Conspiracy: Non-QR scoping mechanisms deliver the same truth conditions that QR would deliver if we ignored islands.

Surely if QR delivers the necessary truth conditions, it should be the presumptive scoping mechanism. As long as we get a more accurate picture of where scope islands actually occur—and in particular, give up the mistaken belief that clauses are scope islands in general—we can hope that QR may be the only scoping mechanism we need.

The following subsections will briefly present a case for indicting five co-conspirators.

3.1 Focus

Rooth’s 1985 dissertation composes focus meanings via pointwise combination of sets of alternatives. Rooth considers using QR as a scoping mechanism for computing focus, but rejects QR for two main reasons. The first reason is that association with

focus is not clause bounded, and so presumably can't be handled by QR; and the second reason is that alternative sets provide an elegant account of multiple foci.

But, as we've seen, QR is not clause-bounded! This motivates rethinking the composition of focus. Multiple foci are no impediment: complete details for handling multiple foci in a QR-based treatment are given in Krifka 1992. Rooth himself, in his 1996 handbook article, discusses the tradeoffs between QR and alternative sets, and presents an empirical argument that QR scoping might be advantageous.

3.2 Indefinites and non-QR scoping

It is well known that the scope of indefinites is definitely not clause bounded. Fodor and Sag 1982 argued that the scope of indefinites is either clause bounded or maximal (root level). Farkas 1981 discovered that (62) has an additional interpretation on which the indefinite takes scope at a strictly intermediate level, in this case, outside of its local clause but inside the scope of *each*.

(62) Each student read every paper that discussed a particular problem. $\forall > \exists > \forall$

Faced either with abandoning clauses as a scope island, or seeking a principled explanation for the behavior of indefinites, the field began the search for a non-QR account of indefinite scope.

Abusch 1994 explained how to understand indefinite scope as a consequence of Heim's 1982 proposal that indefinites contributed properties rather than quantifiers.

Reinhart 1997, Kratzer 1998, and Winter 1995 each argued that indefinites could contribute a variable with the type of a choice function $((e \rightarrow t) \rightarrow e)$. That variable was either bound by a spontaneously generated existential quantifier ("existential closure"), or by context.

For all of these theories, the reason that indefinites were not clause-bounded was simple: they contributed a variable, not a quantifier; and since they weren't quantificational, they didn't need to take scope. This strategy enabled QR to catch all the universally-quantified tuna in its clause-bounded net, at the same time the indefinite dolphins swam free.

Schwartzschild 2002 discussed singleton indefinites: indefinites whose restrictions were pragmatically limited to an extension of cardinality 1, in which case the indefinite could have its scope limited by scope islands, yet the truth conditions would be equivalent to wide scope interpretations.

In a separate strand of the literature, analyses building on the indefinites-as-alternatives (Kratzer and Shimoyama 2002, Alonzo-Ovalle 2006, Charlow 2019) propose that indefinites contribute a set of alternatives, in much the same way that focused phrases do in Rooth's alternative semantics for focus. And just as for focus composition, the sets of alternatives are composed via pointwise function composition.

What is most relevant here is that in each of these proposals, the reason indefinites are not clause bounded is supposed to be because they take scope via some mechanism other than QR; and in each of these proposals, the net effect of the alternative scoping mechanism is equivalent to what we could have derived by using a non-clause-bounded version of QR. That is, alternative semantics is perfectly in accord with the expectations of the exceptional scope conspiracy.

Schwarz 2001 detected signs of the conspiracy, observing that “indefinites can often be interpreted as if they had scoped from a syntactic island.”

An important caveat: Reinhart 1997 argues that QR gives the wrong result for cardinal quantifiers.

(63) If three of my relatives die, I’ll inherit a fortune.

Reinhart observed that we can’t simply use QR to scope *three of my relatives* outside of the conditional, since that would predict a reading that entails that the speaker could inherit as many as three fortunes, one for each wide-scope relative, an interpretation that is not available for (63). She took this to constitute evidence against the conspiracy claim (that unrestricted QR delivers adequate truth conditions).

Alternatively, we can go in for Szabolcsi’s suggestion (e.g., Szabolcsi 2010 chapter 7) that quantifiers routinely contribute both existential quantification and distributive (aka universal) quantification. Examples like (63) are one part of the motivation for this claim, but there is additional motivation from other types of examples. Then the contribution of *three of my relatives* in (63) is roughly ‘there exists an entity X such that for all $x \in X$...’. If the existential part scopes out of the conditional, but the universal part remains trapped in the antecedent, just like overt universals such as *every*, we get the desired truth conditions. The formal fragment below shows one way to implement this strategy using split scope, as advocated in Charlow 2019, discussed in section 3.5 below.

3.3 Functional indefinites

Building on Reinhart 1997, Winter 1997, and others, Schwarz 2001 argues that there are two kinds of indefinites: the kind that can be accurately represented by an existential quantifier with the appropriate scope, and functional indefinites, which don’t appear at first to be simple existentials.

(64) If every student improves in a (certain) area, no one will fail.

$\exists f. \text{if}(\forall x. \text{improves}(x)(f(x)(\text{area}))) (\text{no-fail})$

Schlenker 2006 shows that the truth conditions for (64) are not equivalent to any configuration of *if*, \forall , and \exists . He shows that allowing the indefinite to denote a Skolemized choice function will work, i.e., allowing the variable f in the truth conditions above

to have the type $e \rightarrow (e \rightarrow t) \rightarrow e$. Note that the existence of functional indefinites does not refute the conspiracy hypothesis; even taking the data at face value, all it shows is that there are semantically two kinds of indefinites, differing only in whether they quantify over ordinary choice functions or Skolemized choice functions. Both kinds rely on the introduction of an existential quantifier, and QR remains eminently well-suited to delivering that existential to its scope position.

Bumford 2015, building on insights of Solomon 2011, points out that functional indefinites, like pair-list readings and certain other phenomena, only arise in the presence of a small number of distributive quantifiers, essentially *every* and *each*. For instance, the example above in (64) crucially contains an occurrence of *every*. Bumford suggests that it is the semantics of the distributive quantifiers that is special, and he provides a semantics on which the independently-motivated semantics of the distributive quantifiers, along with an appropriately dynamic theory of indefinites, delivers the functional reading even though the indefinites contribute a completely ordinary simple existential meaning.

The literature contains remarks to the effect that the scope-taking of indefinites is completely unconstrained. This is not right; it is more accurate to say that the scope of indefinites can be arbitrarily wide, and in particular is not clause-bounded. There do seem to be situations in which even an indefinite cannot take wide scope:

(65) Ann only gave a book to BILL. * $\exists > \text{only}$

There is no reading of (65) that entails the existence of some particular book x such that the only person Ann gave x to is Bill. This example suggests that the complement of *only* may be a scope island for indefinites. This claim is tentative, and needs to be confirmed by additional empirical investigation (it is wise to be cautious about making claims about scope islands!).

In any case, the conspiracy theory remains viable throughout this discussion of indefinites: no matter what scoping mechanism is proposed, the truth conditions end up being exactly what they would be if the indefinite introduced an existential quantifier that took scope via QR.

3.4 Functional Relative Clauses

Sharvit 1999 discusses a class of examples in which a universal appears to take scope outside of a relative clause:

(66) ha-iSa Se kol gevev xibek cavta oto [Hebrew]
 the-woman that every man hugged pinched him
 For every man x , the woman that x hugged pinched x .

Sharvit remarks that “if Scoping (Quantifier Raising or ‘quantifying in’) is clause-bounded, as is often argued, it cannot be the mechanism responsible for these read-

ings.” This consideration is a significant factor in driving her to consider an analysis based on a special-purpose silent relativization type-shifting operator (‘Op’):

$$(67) \quad [\text{Op QNP}] \rightarrow \lambda K \lambda P \lambda T \lambda R \exists A [W([QNP], A) \& \\ \forall x \in A [R(T(\lambda g [\text{Dom}(g) = A \\ \& \forall y \in A [P(g(y)) \& K(g, y)])](x), x)]]]$$

This operator expects an adjacent quantifier (‘QNP’). It finds the unique witness A for the quantifier (which requires that the quantifier is upward monotonic, such as a universal quantifier rather than an existential), and quantifies over the atomic elements of the witness set. Here K is the content of the rest of the relative clause (*hugged*), P is the content of the head noun that the relative clause modifies (*woman*), T is the determiner (*the*), and R is a relation formed by abstracting a pronoun position contained within the continuation of the determiner phrase (*pinched him*). The operator collects these pieces and reassembles them in such a way that the net effect is exactly as if the universal had undergone QR to a position taking scope over the matrix sentence. In other words, the operator is engineered to fulfill the expectations of the conspiracy hypothesis.

Sharvit reports that functional relative clauses are only available in Hebrew when the universal in question is in subject position in the relative clause, as reflected in the definition in (67). Farkas and Giannakidou 1996 make a similar observation about when universals can scope out of relative clauses in Greek. However, as we have already seen in (10) and in (18) through (23) there is no subject requirement in English.

Sharvit and others also discuss certain copular sentences in which universals appear to scope out of a relative clause:

$$(68) \quad \text{The woman that [every man loves (the most)] is his mother.}$$

In this example, it appears as if the universal takes scope outside of its containing relative clause, and even binds the pronoun in the postcopular DP. This is one of a number of so-called copular connectivity effects, and the usual diagnosis is that the copular construction is semantically special in some relevant way. I don’t assume that a QR analysis is either desirable or even possible for copular connectivity effects.

3.5 “Scope island? Scope the island!”

There is a well-known technique for obeying the letter of the standard wisdom on scope islands while flouting the spirit. Even if scope takers remain unable to scope out of their minimal clauses, those clause themselves can be raised, and, under various assumptions, scope takers trapped inside the raised clause can in effect take exceptional scope. Charlow 2019 calls this “scoping the island,” and views it as a similar to Nishigauchi’s 1990:42 covert pied piping of *wh* expressions embedded in islands.

(The title of this subsection is advice that Nick Fleisher (personal communication) gives graduate students who need to cope with the incorrect predictions of making QR clause-bounded.)

Scoping the island is conspiratorial behavior: the net result is exactly as if the original scope-taker had scoped out of what was incorrectly assumed to be an island.

Moltmann and Szabolcsi 1994 and Szabolcsi 1997 argue in favor of island-scoping.

- (69) a. Some librarian or other found out which book every student needed.
b. ‘for every student, there is some librarian who found out which book he needed’

They note that it is “standardly assumed” (Szabolcsi 1997: “generally agreed”) that QR is clause bounded. Moltmann and Szabolcsi propose an analysis that respects this assumption. On their analysis, the universal takes scope (only) over the complement of *found out*. Rather than returning a quantified proposition as usual, it returns a function from clause continuations to propositions. For instance, in (69a), the relevant continuation is $\lambda q.$ *some librarian or other found out q* . The net result is “exactly the same as what we would get if *every student* scoped out on its own”. In other words, this is a clear example of the exceptional scope conspiracy.

Moltmann and Szabolcsi 1994 and Szabolcsi 1997 argue in support of their analysis.

- (70) More than one_{*i*} librarian found out which book every boy stole from her_{*i*}.

If *every boy* QRs to matrix position, nothing prevents *one librarian* from binding *her*, as in *More than one_{*i*} librarian gave every boy her_{*i*} email address*. But if the entire embedded clause takes scope, the pronoun is lifted along with the embedded clause to a position where it can’t be bound by *one librarian*. Moltmann and Szabolcsi report that native speaker intuitions favor the island-scoping analysis and not the direct QR analysis.

However, binding is notoriously sensitive to pragmatic factors. The bound reading requires supposing that every boy stole a book from more than one librarian. (Moltmann and Szabolcsi insist on *more than one* rather than a simple indefinite in order to rule out discourse anaphora; note that if the words *more than* are removed from (70), the wide-scope bound reading becomes readily available.) However, if we adjust the pragmatics, the bound reading becomes noticeably easier:

- (71) In fancy restaurants around here, more than one_{*i*} waiter always asks which type of water (still or sparkling) each customer wants him_{*i*} to bring to the table.

At least some native speakers appear to be able to get a reading on which sets of waiters covary with customers, at the same time that the pronoun is bound by *one waiter*.

Charlow 2019 advocates scoping the island. In Charlow’s formal system, alternative-introducing elements such as indefinites are able to take scope over their minimal

clause, respecting the assumption that clauses are scope islands. The same mechanism then allows the clause, which now denotes a set of alternative propositions, to take scope over *its* embedding clause, and so on. The truth conditions work out exactly as predicted by the scope conspiracy hypothesis: as Challow put it, it’s as if “the indefinite had directly undergone one vast island-disrespecting scoping.” Clearly conspiratorial.

In sum, whenever exceptional scope taking is proposed, the exceptional scope conspiracy is in force: no matter what non-QR mechanism is proposed, with respect to truth conditions, the net result is exactly as if the scope taker had taken scope directly via QR in defiance of traditional assumptions concerning scope islands. Given that the traditional assumptions about scope islands appear to be incorrect, as argued in section 2, the obvious strategy should be to assume that all scope-taking takes place via QR. That is, we should be in the business of trying to understand where and when scope-takers can take scope, not figuring out technical devices that allow scope takers to smuggle their truth conditions across the gerrymandered borders of scope islands.

4 A robust scope island: negative polarity items

If clauses and relative clauses are not uniformly islands, we might want to consider the idea that scope restrictions are not part of the grammar after all, but rather arise from considerations of parsing efficiency (White et al. 2017) or processing difficulty (Wurmbrand 2018). In this section, I will argue that there are some scope islands that are so robust that they must be enforced by the grammar.

Negative Polarity licensing provides a compelling example. Weak NPIs (e.g., in English, *any* and *ever*) must occur in a suitable licensing context. In addition, they must take scope inside that licensing context.

(72) If [a relative of mine dies], I’ll inherit a house. [ambiguous]

(73) If [**any** relative of mine dies], I’ll inherit a house. [unambiguous]

The grammaticality of (73) follows from assuming that the antecedent of a conditional is a licensing environment for *any*. The truth conditions are identical to the narrow scope reading of (72). But (73) does not have a reading corresponding to the wide scope reading of (72). At least on a descriptive level, we can think of a negative polarity item as an indefinite whose scope must be restricted to its licensing environment.

This should not be surprising. Although it is conceptually possible that an NPI-like expression could require local licensing, yet still take arbitrarily wide scope, it seems natural enough that an NPI would have its scope trapped within its licensing context.

What is crucially important here is that merely guaranteeing that an NPI must take scope within its licensing context is not enough to get the scope facts right. The reason is that when an NPI has two potential licensors, it must be licensed by the

closest potential licenser.

(74) Ann doubts Bill didn't see anyone. *doubt > \exists > not

This is precisely what we should expect if licensing contexts are scope islands for weak NPIs.

If there are scope islands that trap weak NPIs, this can potentially provide new insight into the intervention effects reported in Linebarger 1987:

(75) Ann doubts that Bill saw anyone.

(76) *Ann doubts that everyone saw anyone.

If the nuclear scope of *everyone* is a scope island for *anyone*, we have an explanation for (76): the scope island created by *everyone* traps *anyone*, which prevents it from taking scope wide enough to be licensed.

Despite the vast literature on negative polarity, as far as I know, there has not yet been a study on the scope interactions of NPIs with their licensors and other scope-sensitive operators. As a result, any claims about NPIs and scope islands must be tentative; but it seems likely that the licensing contexts of weak NPIs are bone fide scope islands. If so, the robust ungrammaticality of an unlicensed NPI suggests that some scope islands at least must be grammatically enforced.

5 The subset principle

The data in the previous sections support the following claims:

- Relative clauses are not scope islands
- Clauses are not scope islands
- Scope islands are created on a per-predicate basis (e.g., the complement of *think* is a scope island for universals, but *make sure* is not)
- Scope islands trap some scope-takers but not others (e.g., indefinites can escape from some islands that universals cannot)

This section poses the following research question: how many different kinds of scope islands are there? The methodological goal here is to imagine a worst-case scenario in which we need several distinct flavors of scope island. I'll argue that there are several flavors of islands, but that they obey a systematic constraint that I will call the Subset Principle.

The traditional answer to the question of how many types of islands we need is "one". On this view, a scope island traps all (and only) elements that take scope via

QR, including universals. Because indefinites take ‘exceptional’ scope via some non-QR method, they are not trapped by the island.

However, taking the empirical claims in section 4 at face value, we must distinguish at least two distinct types of scope island, depending on whether they trap NPIs or not:

- (77) Ann doubts Bill thought everyone left.
- (78) Ann doubts Bill thought anyone left.
- (79) Ann doubts Bill thought a friend of hers left.

We’ve seen that the complements of attitude verbs like *doubt* and *think* create islands that trap universals like *everyone*, so in (77), the scope of *everyone* is trapped beneath *thought*. In contrast, in (78), there is an interpretation on which *anyone* scopes immediately under *doubt* (what Ann doubts is that there is any person *x* such that Bill thought *x* left). So *think* cannot be an island for *anyone*. Finally, (79) has an interpretation on which the ordinary indefinite takes widest scope, so *doubt* cannot be a scope island for ordinary (i.e., non-NPI) indefinites.

In fact, it turns out that there are contexts that trap the scope even of ordinary indefinites. I’m not aware of any place in the literature where this has been noted:

- (80) Ann only gave a book to BILL.

When an indefinite occurs in the focus domain of VP-modifier *only*, it must take scope inside the focus domain. That is, (80) does not have an interpretation on which it entails the existence of a specific book *x* such that the only person Ann gave *x* to was Bill (which would be compatible with there being a different book *y* that Ann gave to several people).

For theorists who favor treating indefinites as introducing alternatives, this new observation may be welcome. Since *only* manifestly collapses the alternatives introduced by the presence of a focus operator, we might expect that it will capture the scope of any other alternative-introducing operators, including indefinites.

Unfortunately, it’s not quite that simple. As Charlow 2019 observes, different indefinites can take different scopes.

- (81) If [a persuasive lawyer visits a rich relative of mine], I’ll inherit a house.

He observes that either or both of the indefinites can take scope inside or outside of the antecedent of the *if* clause. Charlow accomplishes this by allowing (rather, failing to prohibit) higher-order scope-taking, which produces layers of scope-taking. Glossing over the technical details, lower layers can be collapsed without preventing higher layers from taking wider scope. Given indefinite layering, the natural expectation is that *only* would capture only the lowest layer of alternatives. Forcing *only* to extinguish

all layers would require special stipulation. In the system here, the desired result falls out from making the complement of *only* a kind of island that traps both indefinites and focus.

Is the focus domain of *only* such a strong island that nothing escapes? No: expressives can escape from any island.

(82) Ann said she only showed the damn book to BILL.

It is the speaker, not Ann, who is committed to the expressive contribution of *damn*. It is not self-evident that expressives should be analyzed as scope-takers, but in the spirit of the exceptional scope conspiracy described above, a scoping analysis certainly works here.

We can now take stock. In the chart below, a ‘*’ indicates that there is empirical data suggesting that the scope-taker at the top of the column cannot escape from the scope island created by the predicate on the left.

	Island strength:				
	damn	someone	anyone	everyone	
only	*	*	*		3
if		*	*		2
thought			*		1
make sure					0
	3	2	1	0	← Escaper strength

There is an obvious pattern: all of the stars are bunched up in the top right corner. This motivates the following generalization:

The scope island subset principle: given any two scope islands, the scope-takers trapped by one is a subset of the scope-takers trapped by the other.

If the subset principle holds in general, we can associate each scope island with an element in a strict ordering, which we can think of as the strength of the island in question. For instance, in the chart above, the strength of each island-creating predicate has been associated with the number of classes of scope-taker it traps. For instance, the antecedent of *if* is assigned an island strength of 2, since it traps NPIs and universals. Likewise, we can characterize the island-escaping capacity of each scope-taker by associating it with the strength of the strongest island it is able to escape. Thus indefinites like *someone* are assigned an island-escaping strength of 2, since they can escape from attitude verb complements and the antecedent of an *if* clause.

There is nothing special about using integers to index island strength, any well-ordered set will do.

6 Encoding and enforcing islands

Now that we have an empirical target to aim for, I will propose a simple grammatical formalism that can encode and enforce scope islands.

In order to create scope islands on a per-predicate basis, we must be able to annotate the lexical category of each predicate to indicate which ones create islands and which ones don't. Furthermore, in order to allow the various scope islands to selectively trap some scope takers but not others, the lexical entries must further specify which exact flavor of island each predicate creates.

Figure 2 illustrates a simple way to manage scope islands. Using standard categorial grammar notation, a predicate will have a functional type of the form $A \backslash B$ (a predicate that follows its complement) or B / A (a predicate that precedes its complement). We can elaborate these categories with an integer corresponding to the strength of the island that predicate creates. For instance, based on the table above, we can assign *thought* to the lexical category $(DP \backslash S) /_1 S$.

We can use the same technique to encode the island-escaping strength of a scope-taker. For instance, we can assign *someone* to the category $S / (DP \backslash_2 S)$, and *everyone* to the category $S / (DP \backslash_0 S)$. These lexical categories have the semantic type of a generalized quantifier, that is, $(e \rightarrow t) \rightarrow t$. In particular, the subcategory $DP \backslash_n S$ specifies the type of the nuclear scope of the quantifier, namely, $e \rightarrow t$, where DP determines the type e of the trace left by Quantifier Raising.

With these lexical categories in place, here is how scope islands will be enforced: after executing Quantifier Raising, if the path between a quantifier and its trace crosses a node with an equal or higher index, that's an island violation.

We can construct a small fragment based on the table above.

ann DP	everyone $S / (DP \backslash_0 S)$	only $(DP \backslash S) /_3 \text{FOC}$
dog N	anyone $S / (DP \backslash_1 S)$	FOCUS $(\text{FOC} / (DP \backslash_3 (DP \backslash S))) / DP$
left $DP \backslash S$	someone $S / (DP \backslash_2 S)$	damn $UT / ((N / N) \backslash_3 S)$
the DP / N	thought $(DP \backslash S) /_1 S$	
saw $(DP \backslash S) / DP$	if $(S / S) /_2 S$	

The following derivations will illustrate the predictions of this tiny lexicon.

- (83) a. Ann thought everyone left.
 b. (thought (everyone left)) ann
- (84) a. Ann thought someone left.
 b. (thought (someone left)) ann
 c. someone $(\lambda x ((\text{thought} (\text{left } x)) \text{ ann}))$

These semantic analyses were produced mechanically by the algorithm described in the next subsection. For each example, the complete set of interpretations produced

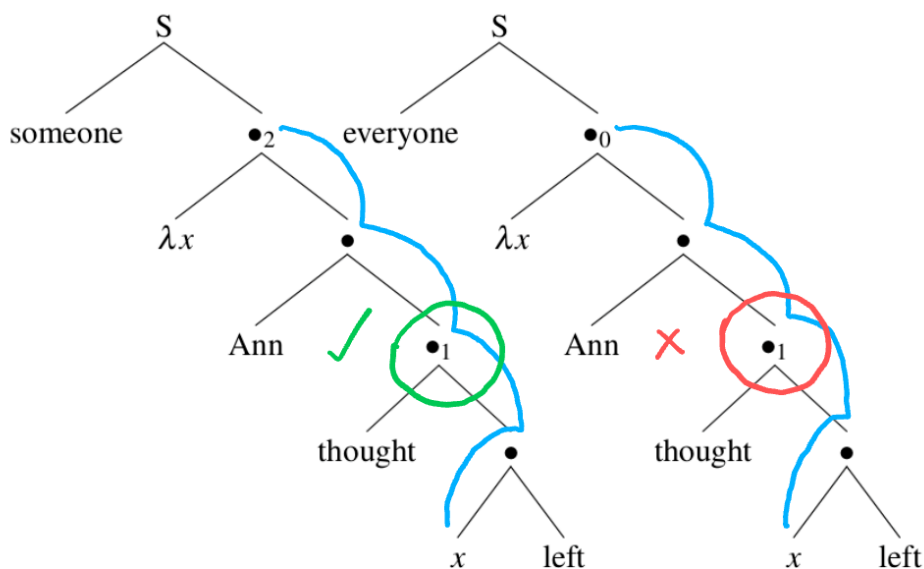


Figure 2: Enforcing island restrictions for *Ann thought someone/everyone left*. If the path from a QR-raised scope-taker crosses a node with a strength higher than the strength assigned to the scope-taker, a violation occurs. On the left, the path corresponding to a scope-taker with strength 2 can cross an island of strength 1 without creating a violation. On the right, the path of a scope-taker of strength 0 crosses an island of strength 1, creating a violation. (Unlabeled nodes have strength 0.)

by the algorithm are given. So the fact that (83) displays just one interpretation while (84) displays two reflects the fact that the fragment accurately predicts that *someone* is a stronger island-escaper than *everyone*.

The antecedent of a conditional is a scope island for weak NPIs, but not for ordinary indefinites:

- (85) a. If anyone left, Ann left.
 b. (if (anyone left)) (left ann)
- (86) a. If someone left, Ann left.
 b. (if (someone left)) (left ann)
 c. someone (λx ((if (left x)) (left ann)))

Although ordinary indefinites can take scope out of many islands that trap other types of scope-takers, it is not true that they can always take wide scope.

- (87) a. Ann only thought someone saw BILL.
 b. (only (BILL, λx (λy ((thought (someone (λz ((saw x) z))) y)))) ann
 c. (only (BILL, λx (λy (someone (λz ((thought ((saw x) z)) y)))))) ann

For the sake of concreteness, I've adopted a structured meaning approach to focus in the style of, e.g., Krifka 1992, in which the focus particle *only* takes an ordered pair consisting of the focussed phrase and a continuation created by abstracting the focussed phrase; nothing hangs on this choice. When *someone* takes scope under *thought*, as in (87b), the property that Bill alone possesses is having Ann think this: that someone saw him. When *someone* takes scope over *thought*, as in (87c), the distinctive property involves Ann having thoughts about specific people seeing other people. The difference in truth conditions is subtle, and has to do with whether Ann's thoughts can be described using indefinite meanings.

The point of interest here is that there is no reading on which *someone* takes scope over the entire focus domain, which would entail the existence of some person x such that it was only Bill that Ann thought x saw. As discussed above, this reading does not appear to be an available reading for (87a), as predicted by making the complement of *only* a scope island too strong for even indefinites to climb out of.

Finally, no scope island is strong enough to trap an expressive like *damn*:

- (88) a. Ann only thought the damn dog saw BILL.
 b. $\text{damn } (\lambda x ((\text{only } (\lambda y (\lambda z ((\text{thought } ((\text{saw } y) (\text{the } (x \text{ dog})))) z))) \text{ ann}))$

Unlike indefinites, *damn* can escape even from a focus domain. In the terminology of Potts 2005, expressives are *speaker-oriented*: they always commit the speaker to certain attitudes, no matter how deeply the expressive is embedded.

6.1 A formal implementation using type logical combinators

As illustrated in figure 2, the algorithm works by examining each local step in the path from trace position to scope position. Therefore an implementation must break down each instance of Quantifier Raising into a series of strictly local steps. This is exactly how the combinator-based type logical grammar proposed in Barker 2007 works, so that grammar is well suited to implementing scope islands. I will sketch the formal system here, but see Barker and Shan 2014 chapters 13 and 17 for full details.

$$\begin{array}{c}
 \frac{\Gamma \vdash A \quad \Sigma[B] \vdash C}{\Sigma[\Gamma \bullet_i A \setminus_i B] \vdash C} \setminus L \qquad \frac{A \bullet_i \Gamma \vdash B}{\Gamma \vdash A \setminus_i B} \setminus R \qquad \frac{}{A \vdash A} \text{Axiom} \\
 \\
 \frac{\Gamma \vdash A \quad \Sigma[B] \vdash C}{\Sigma[B /_i A \bullet_i \Gamma] \vdash C} /L \qquad \frac{\Gamma \bullet_i A \vdash B}{\Gamma \vdash B /_i A} /R \\
 \\
 \frac{\Gamma}{\Gamma \bullet_i I} I \qquad \frac{(\Delta \bullet_j \Gamma) \bullet_i \Pi}{\Delta \bullet_j (\Gamma \bullet_i (\Pi \bullet_0 B))} B \qquad \frac{\Gamma \bullet_i (\Delta \bullet_j \Pi)}{\Delta \bullet_j (\Gamma \bullet_i (\Pi \bullet_0 C))} C
 \end{array}$$

I'll illustrate a successful escape from a scope island with a derivation of *Ann thought someone left* on which *someone* takes wide scope over *thought*. Although this derivation contains many details, it is merely a algorithmically explicit accounting of the Quantifier Raising analysis diagrammed in figure 2 above, and is fully equivalent.

[illegible]

²This particular constraint expresses the Subset Principle. Any other desired relationship between which trace modes can escape from which island modes can be encoded by placing different constraints on instantiating the structural inferences.

are 0. Reading from top to bottom, there is a box around the DP type that appears in embedded subject position. This position corresponds to the trace of Quantifier Raising. The progress of the boxes as the derivation proceeds shows how the combinators move the trace category step by step from trace position to its raised position.

In the second half of the derivation, the $S/(DP \setminus_2 S)$ generalized quantifier type of *someone* is also boxed. This shows how the structural postulates move the quantifier category from its scope-taking position back into the position originally occupied by the trace, where it is pronounced.

The point at which the trace associated with *someone* escapes from the complement of *thought* is the highest C inference, marked in the diagram with a dagger[†]. This instantiation of the C inference has $i = 1$ and $j = 2$. Since $j \geq i$, this is an allowable instantiation of the inference rule.

The semantic interpretation of the derivation is **someone** $(\lambda x. \mathbf{thought}(\mathbf{left} \ x)(\mathbf{ann}))$, as desired. This follows automatically via the Curry-Howard correspondence mapping type-logical derivations onto terms in the lambda calculus. Roughly, the *L* inferences correspond to function application, and the *R* inferences correspond to lambda abstraction; see, e.g., Moortgat 1997 or Barker and Shan 2014 chapter 13 for details.

If we replace *someone* with *everyone*, an attempt to give *everyone* wide scope creates an island violation. The derivation would begin exactly like the derivation just given, except that in order to eventually match the lexical type of *everyone* at the end of the derivation, the instantiation of the *I* postulate that launches the Quantifier Raising would have to introduce mode 0, instead of mode 2:

$$\begin{array}{c}
 \vdots \\
 \frac{\text{DP} \bullet ((\text{DP} \setminus S) /_1 S \bullet_1 (\boxed{\text{DP}} \bullet \text{DP} \setminus S)) \vdash S}{\text{DP} \bullet ((\text{DP} \setminus S) /_1 S \bullet_1 ((\boxed{\text{DP}} \bullet_0 I) \bullet \text{DP} \setminus S)) \vdash S} I \\
 \frac{\text{DP} \bullet ((\text{DP} \setminus S) /_1 S \bullet_1 ((\boxed{\text{DP}} \bullet_0 I) \bullet \text{DP} \setminus S)) \vdash S}{\text{DP} \bullet ((\text{DP} \setminus S) /_1 S \bullet_1 (\boxed{\text{DP}} \bullet_0 (I \bullet (\text{DP} \setminus S \bullet B)))) \vdash S} B \\
 \frac{\text{DP} \bullet ((\text{DP} \setminus S) /_1 S \bullet_1 (\boxed{\text{DP}} \bullet_0 (I \bullet (\text{DP} \setminus S \bullet B)))) \vdash S}{\text{DP} \bullet (\boxed{\text{DP}} \bullet_0 ((\text{DP} \setminus S) /_1 S \bullet_1 ((I \bullet (\text{DP} \setminus S \bullet B)) \bullet C))) \vdash S} C^\dagger
 \end{array}$$

But then instantiating the daggered C inference would require choosing $i = 1$ and $j = 0$. Since $j \not\geq i$, the daggered instance of C is not allowable, and we correctly predict that a scope island violation has occurred.

6.2 Previous formal accounts of scope islands

Rodman 1976 adapts Montague's 1973 fragment in a way that enforces relative clauses as a scope island. His strategy is to adjust the relative clause formation rule, as well as the Quantifying In rule, so that a quantifier cannot bind into a relative clause. However,

it is far from clear how to translate Rodman’s approach into a more modern theory, and I won’t try here.

There are a number of accounts that make fine-grained distinctions among scope-takers, and then constrain where those scope-takers are allowed to take scope. Beghelli and Stowell 1997 is an especially prominent instance of this strategy. They articulate the left periphery of the clause into a sequence of nested functional categories, and then mark which classes of scope-takers are allowed to move into each of the functional projections. Their analysis makes a large number of welcome empirical predictions. However, nothing in their system limits scope-taking to a minimal clause, or to any other island context. We may ultimately need some analysis like Beghelli and Stowell’s to have a complete account of scope constraints, but we must look beyond their analysis for a general mechanism for enforcing scope islands.

Bernardi and Szabolcsi 2008 pursue a Beghelli and Stowell style approach within a formal system that provides a derivability relation both among the syntactic categories of the scope-takers. This establishes a partial order among scope-takers that enables Bernardi and Szabolcsi to state useful generalizations over classes of scope-takers. However, like Beghelli and Stowell, they also assume some unspecified mechanism that enforces scope islands.

Bernardi and Szabolcsi pursue their investigation in the setting of a type logical grammar, taking advantage of the unary modalities, Galois connectives, and logical derivability afforded by the type-logical approach. Unlike other well-known formal systems, the type logical tradition has long provided explicit mechanisms for constraining a variety of grammatical phenomena, from scrambling to associativity to scope taking. The first decades of this work is concisely summarized in Moortgat 1997. He explains how unary modalities can be deployed in a “lock and key” strategy: one modality (the lock) creates an island, and only elements marked with the dual modality (the key) can remove the lock to enable the completion of the derivation. In the usual deployment (e.g., Moortgat 1997, Bernardi 2002), scope takers are able to take scope freely within a region, but their scope-taking must be extinguished before the context that contains them (say, an embedded clause) can be placed under the key modality. Although this strategy can guarantee that scope-takers are restricted to their smallest containing clause (or other island), and although it is admirably flexible about creating islands on a per-predicate basis, it is not flexible about distinguishing among different scope-takers: in the usual configuration, either all scope-takers are trapped, or none.

Kokke 2016 builds on the type-logical grammar for scope-taking developed in Barker 2007, Barker and Shan 2014, using a technique related to a proposal in Barker and Shan 2014:221. He supplements the lock and key strategy with special-purpose structural inference rules that allow specific scope-takers to escape from selected islands. For instance, he shows how to allow indefinites to scope out of embedded clauses at the same time that universals are trapped. In general, this allows for a sys-

tem that creates islands that are both per-predicate and per-scope taker. Like Kokke’s approach, the grammar below extends the same technique from Barker and Shan 2014:221, but unlike Kokke, the account here does not make use of any unary modalities.

Kiselyov and Shan 2014 develop a continuation hierarchy along the lines of Danvy and Filinsky’s 1990 general strategy for building hierarchical layers of continuations. The idea is that a scope-taker is an expression that takes a portion of its context (one of its ‘delimited continuations’, in the jargon of work on continuations) as its argument. A scope island, then, is a context that bounds the scope-takers it contains. But if a scope-taker has a high enough type (higher in the continuation hierarchy) to take the context of its context as an argument, it can escape from the scope island. Kiselyov and Shan construct a hierarchy of levels of scope island and island escaping scope takers.

The system of Kiselyov and Shan has excellent theoretical and computational properties. In addition, it has plenty of fine-grained control: it establishes islands on a per-predicate, per-scope taker basis. There are a number of deep correspondences between their approach and the one developed here: both explicitly recognize continuations as a conceptual basis, and both make use of integers to index the strength of islands and island-escapers. But there are conceptual differences as well: for Kiselyov and Shan, quantifier scope ambiguity is due to (systematic, rule-governed) polysemy in the scope takers. In contrast, on the system here, each scope-taker has a single type and a single denotation. In addition, the Kiselyov and Shan grammar has some expressive limitations in the form in which they present it: only clauses can be islands, scope takers can take scope only over clauses, the result type must be a clause. In practical terms, this means that their system cannot address focus, expressives, or adjectives like *same* that take parasitic scope, all of which are included in the fragment described below. In addition, it is worth mentioning that although the Kiselyov and Shan grammar is easy to implement computationally and highly efficient, the types are too complex to perform derivations accurately by hand.

7 Towards a more explanatory theory

I have concentrated in this paper on a *when* question and a *how* question: When is a scope taker trapped or not? How can we enforce scope islands grammatically? What about the *why* question? On some theories, the behavior of scope takers follows from independently-motivated aspects of their meaning.

For instance, in a theory on which indefinites contribute sets of alternatives, the reason indefinites are immune to the scope islands that trap other quantifiers is because indefinites take scope by means of a mechanism that is independent of Quantifier Raising. Furthermore, if we assume that the alternatives contributed by indefinites

are of the same nature as the alternative contributed by focus marking, we also have a satisfying explanation for why indefinites never take scope outside of a focus operator like *only*, as observed above in (87b): given that *only* collapses the alternative set created by focus marking, it will naturally also capture the alternatives contributed by any indefinite contained within the focus domain, and extinguish the propagation of those alternatives further up the compositional tree. The seductive beauty of this idea is that the scope possibilities of an indefinite follow from their contribution to truth conditions, that is, from their meaning.

Likewise, it is tempting to decide that the reason that NPIs must take narrow scope with respect to their licensing context is because that is simply part of the nature of being licensed. That is, we might suppose that at least part of the reason why NPIs need to be licensed is precisely in order to constrain the scope relations of what would otherwise be a potentially wide-scoping indefinite. Barker 2018 explores this line of thought in some detail.

In other cases, convincing explanations are much harder to find. Why is *realize* but not *make sure* an island for *everyone*? Why do downward-monotonic operators resist undergoing inverse scope? Why do they also create scope islands for lower quantifiers?

As scientists, we're in the business of answering the *why* question. Ultimately, we should hope that the well-ordering of island strengths will follow from independently motivated aspects of a general theory of meaning, rather than being stipulated as they are here. But first we have to get the empirical picture right, and then we have to have a way of describing the patterns we find explicitly and precisely.

7.1 Syntactic islands?

As shown in Barker 2019, the formal system described in section 6 above can easily be extended to describe syntactic (overt) movement. All that is required is the addition of a unit type. Allowing the unit to undergo Quantifier Raising (which would now more accurately be named 'internal merge') creates a movement trace. This allows moved constituents to specify the strength of their movement trace, just as we saw above how a scope-taker could specify the strength of its QR trace. Then a syntactic island would be any constituent whose island strength was too great for the relevant trace to escape from.

Managing syntactic islands and scope islands within a single formal system would allow us to return the beautiful idea. Do syntactic islands obey the Subset Principle? If so, is there a single unified ordering of island strength that accurately describes both overt and covert island strength?

8 Conclusions

Contrary to long-established standard wisdom, abundant data shows that neither tensed clauses nor relative clauses are scope islands.

Therefore theoretical decisions motivated by the belief that scope is clause-bounded need to be rethought, including the semantics of focus, indefinites, functional relative clauses, and more.

I’ve proposed as a methodological strategy that whenever Quantifier Raising can deliver appropriate denotations, it should be the presumptive scoping mechanism. Since I’m not currently aware of any situation in which Quantifier Raising cannot deliver appropriate denotations, Quantifier Raising is a candidate for a single general mechanism for all scope-taking.

Moving forward, despite decades of careful observation—epitomized and collected in Szabolcsi 2010—we still have only a hazy idea what the full picture of scope islands looks like. We can’t effectively explore the empirical landscape unless we have the ability to describe the patterns that we find in an explicit and precise manner. Any descriptively adequate formalism must be remarkably fine-grained, not only capable of distinguishing one embedding predicate from another, but also distinguishing one scope taker from another. This paper builds a suitably fine-grained formal account along lines pioneered by Barker and Shan 2014 and Kokke 2016, with some advantage in generality, simplicity, and usability over the approach of Kiselyov and Shan 2014.

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