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Certain Verbs Are Syntactically Explicit Quantifiers

Anna Szabolcsi
Department of Linguistics, New York University
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Abstract: Quantification over individuals, times, and worlds can in principle be made explicit in the syntax of the object language, or left to the semantics and spelled out in the meta-language. The traditional view is that quantification over individuals is syntactically explicit, whereas quantification over times and worlds is not. But a growing body of literature proposes a uniform treatment. This paper examines the scopal interaction of aspectual raising verbs (*begin*), modals (*can*), and intensional raising verbs (*threaten*) with quantificational subjects in Shupamem, Dutch, and English. It appears that aspectual raising verbs and at least modals may undergo the same kind of overt or covert scope-changing operations as nominal quantifiers; the case of intensional raising verbs is less clear. Scope interaction is thus shown to be a new potential diagnostic of object-linguistic quantification, and the similarity in the scope behavior of nominal and verbal quantifiers supports the grammatical plausibility of ontological symmetry, explored in Schlenker (2006).

1. INTRODUCTION

Quantification over individuals, times, and worlds can in principle be made explicit in the syntax of the object language, or it may be left to be spelled out in the meta-language. Explicit quantification is exemplified by the use of operators like λ, ∃, and ∀, which achieve their semantic effect by operating on object-language arguments. Implicit quantification is exemplified by the use of operators like ^, ◊, and □, which affect interpretation in similar ways but do not operate on object-language arguments. The traditional view is that quantification over individuals is syntactically explicit, whereas quantification over worlds and times is meta-linguistic, implicit (in logical languages that seek to capture the corresponding phenomena of natural languages that have those phenomena). But a significant body of literature finds it appropriate to treat these uniformly. See, for example, Quine (1960) and Ben-Shalom (1996) re: individuals; Groenendijk & Stokhof (1984), Percus (2000), Percus & Sauerland (2003), Lechner (2007) re: worlds; Partee (1973), Cresswell (1990), Iatridou (1994), Kratzer (1998), Schlenker (1999, 2004), von Stechow (2004), Kusumoto (2005) re: times and worlds. See Schlenker (2006) for a thorough discussion of ontological symmetry in general.

The standard diagnostics for explicitly quantifiable arguments in natural language are the existence of variable-like pronouns referring to the syntactically represented argument, the fact that the argument is not evaluated with respect to a

single index, and the fact that the argument need not be linked to the closest suitable operator. Section 2 illustrates the difference between the implicit and the explicit methods using the simple example of abstraction over worlds in the semantics of questions in Karttunen (1977) and Groenendijk & Stokhof (1984). It also clarifies, following Cresswell (1990), that explicit quantification is not the same thing as having variables and variable-binding in logical syntax. The implicit vs. explicit distinction is independent of the choice between a lambda-calculus-style and a variable-free (combinatory) logical syntax.

Starting with Section 3 the paper examines a new set of linguistic data pertaining to the scopal interaction of aspectual and intensional raising verbs with quantificational subjects. Sentences like (1) are ambiguous in English:

(1) In May only Mary began to get good roles.
(i) `Only Mary is such that she began to get good roles'
(ii) `It began to be the case that only Mary was getting good roles'

Many languages disambiguate the two readings in their overt syntax. It will be argued that some, though not all, of these cases involve verb fronting that affects the scope of the verb's quantificational content relative to that of the subject, and moreover does so in a way that makes it plausible that quantificational verbs "raise" and "reconstruct" much like nominal quantifiers do. The argument rests on data from Shupamem, a Grassfield Bantu language, and to a lesser extent on Dutch; some discussion is offered of the ambiguity found in English. Section 4 asks, in a preliminary fashion, whether the same scopal interaction is replicated by intensional operators. I will observe that at least some modal auxiliaries do replicate the effects, but intensional raising verbs do not offer systematic evidence so far. – This paper elaborates on discussion in Szabolcsi (2010).

2. IMPLICIT VS. EXPLICIT QUANTIFICATION

2.1. The Expressivity Of Implicit Vs. Explicit Quantification

Abstraction is the most basic form of quantification. Let us compare how implicit and explicit quantification work, using Karttunen's (1977) and Groenendijk & Stokhof's (1984) respective interpretations of a question like *Who walks?* as our example.

Karttunen interprets *Who walks?* as the set of true propositions that are identical, for some individual or other, to the proposition that this individual walks.

(2) *who walks*, as a complement of *know*/*wonder*, Karttunen
$\lambda p \exists x[p = {}^{\wedge}\text{walk}(x) \wedge {}^{\vee}p]$

He uses Montague's (1974) type theory, in which *s* by itself is not a type, although the type of functions from possible worlds to α-type things, $\langle s, \alpha \rangle$, is defined; see (3).

(3) e, t ∈Type
If α, β ∈Type, ⟨α, β⟩ ∈Type
If α ∈Type, ⟨s, α⟩ ∈Type

Montague's "up" operator ^ is employed in the expression of intensional identity in (2). ^ is a syncategorematic operator that assigns, to any expression, the function that picks out that expression's denotation (or truth value) in every possible world. Montague's "down" operator ˇ is involved in expressing that *p* is true. ˇ is a syncategorematic operator that assigns, to any function of type ⟨s,a⟩ its value in the world of evaluation.

Groenendijk & Stokhof argue that as a complement, *who walks* contributes differently to *Bill knows who walks* and *Bill wonders who walks*. The former means that Bill knows the answer to the question who walks, i.e. the proposition that specifies, for each world, whether those who walk in that world are the same as those who walk in the actual world. If the actual walkers are Pat and Kim, then Bill knows the proposition that the walkers are Pat and Kim. More directly relevant to present concerns is *who walks* in *Bill wonders who walks*. Here, it contributes the intension of the former denotation, a partition of the set of worlds into subsets (cells), where each cell contains worlds in which the walkers are the same. Such a partition is a set of pairs of worlds ⟨j,i⟩ with the same-walkers property.

This set could not be defined using Montague's syntactically implicit operators ^ and ˇ. The operator ˇ does not apply an intension-function to an arbitrary world as an argument, only to the world of evaluation, so it cannot create an open formula. And even if a formula independently contained a free world variable, prefixing it with ^ would not abstract over that variable. Moreover, the action of one ^ operator would be not able to cross the action of another ^ operator. Therefore Groenendijk & Stokhof switch to Gallin's (1975) two-sorted type theory Ty2, where *s* is a type alongside *e* and *t*; see (4). Thus a world argument can be recognized and explicitly abstracted over; see (5)-(6).

(4) e, t, s ∈ Ty2
If α, β ∈ Ty2, ⟨α, β⟩∈ Ty2

(5) *who walks*, as a complement of *know*, G&S
λi[λx[walk(i)(x)] = λx[walk(w_*)(x)]]

(6) *who walks*, as a complement of *wonder*, G&S
λjλi[λx[walk(i)(x)] = λx[walk(j)(x)]]

Having seen the basic usefulness of explicitly manipulating a world argument, let us pause here to clarify a question. How does the issue of explicit (object-linguistic) quantification relate to the choice between variable-ful and variable-free systems? Is explicit quantification the same thing as having variables and variable binding in the logical syntax or at LF?

2.2. More On Expressivity

In general, systems with variables bound by λ-operators and quantifiers have the same potential expressive power as ones with operations on functions (Curry & Feys 1958, Quine 1960). The specific question whether capturing the meanings of natural language sentences requires the expressive power of quantifying over times and worlds, and whether, if it does, this in turn commits us to binding world variables is the overarching theme of Cresswell (1990). He answers the expressivity question in the positive. Two of the simpler examples that support the claim that we need the expressive power of time and world quantification are as follows:

(7) Once everyone now happy was going to be miserable. (times)
(8) It might have been that everyone actually rich was poor. (worlds)

More recently Yanovich (2011) has investigated just how much expressive power is needed for temporal indexicality in natural language, based on a system with Cresswell-style **now** and **then** operators. The conclusion seems to be that indeed more power is needed than in a Priorean system, but not much more. At least in examples that do not specifically use the word *time* (such as, *There is a time when...*) all new time variables come with a restrictive clause ensuring that they range over points accessible from the current point.

To what extent Yanovich's result suggests a major difference between individual quantification and time quantification in natural language is a separate question. Ben-Shalom (1996) presents quantification over individuals in terms of a modal propositional language, where determiners correspond to the modal operators, and their nominal restrictions to accessibility relations. Bearing the parallelism between accessibility and restriction in mind, we observe that semanticists tend to believe that individual quantifiers in natural language are typically (or even always) restricted, given the prevalence of conservativity and extension in determiner meanings. If that view is correct, then natural-language individual quantification does not have so much more expressive power than time quantification. But see Szabó (2011) for a thorough examination of the possibility that natural language determiners generally support readings where they are not restricted by overt linguistic material, although these readings are rarely distinguishable from overtly restricted ones. One of the intuitively most robust cases with a truth-conditional effect is as follows:

(9) This election could have two winners.
`There are two individuals each of whom could be a winner of this election'

Similar readings have been discovered by Mascarenhas (2010):

(10) The matchmaker got two husbands for Mary.
`The matchmaker's actions turned up two individuals each of whom Mary could take as a husband'

In sum, not only the exact expressivity of temporal or world quantification in natural language, but also that of individual quantification is to some extent an open question.

2.3. Variable Binding Vs. Argument Manipulation

Cresswell's answer to the second question – Are we now committing ourselves to a variable-ful treatment? – is in the negative:

> "For my purpose is to shew that the facts of natural language are such that if we begin with a possible worlds semantics for it at all, then we must have one which has the power of quantification over worlds. Perhaps some will say that even if $\mathcal{L}^*$ has the power of quantification over worlds yet it still does not quantify over worlds, because it actually does not have world variables. My reply to that is simple. If possession of variables is a *syntactic* matter then it is doubtful that natural language quantification has variables in *any* interesting sense even if pronouns have sometimes been thought to be such. If it is not a syntactic matter then I am unsure what other criterion can be given than expressive power." (Cresswell 1990, p. 61)

Quine (1960) and Cresswell (1990) use the language of modal propositional logic enriched with operators that manipulate the arguments of propositional functions to achieve the desired expressive power. Quine employs two argument-list re-arranging operations and reflexivization, in addition to ones capturing existential quantification, negation, and conjunction. Cresswell (1990, p. 226) refers to Steedman (1988) and Szabolcsi (1987) for linguistic support of the idea that the effect of variables in natural language syntax can be successfully obtained by the operators of combinatory logic. Steedman and Szabolcsi – and proponents of combinatory categorial grammar, CCG, in general – employ a type-theoretic logic enriched with combinators in the style of Curry & Feys (1958).

As a brief illustration of how the job of λ-operators in the logical syntax is performed by combinators, we paraphrase Groenendijk & Stokhof's (6). The paraphrase is built combining *walk*, a function of type ⟨s,⟨e,t⟩⟩ and equality (=), a function of type ⟨⟨e,t⟩, ⟨⟨e,t⟩, ⟨e,t⟩⟩⟩ with the help of functional composition and permutation. Functional composition is an operation crucially involved in the grammar of *wh*-extraction (Steedman 1988), in non-constituent coordination (Dowty 1988) and, applied to the identity map (**I** = λa[a]), in the semantics of paycheck pronouns (Jacobson 1999), among other things.

(11) Compositor **B** = λfλgλh[f(gh)]
in combinator notation: **B**fgh = f(gh)

The permutator **C** reverses the order of the first two arguments of a function.

(12) Permutator **C** = λfλaλb[fba]
in combinator notation: **C**fab = fba

Who walks as in (6) is now expressible as follows:

(6′) λjλi[λx[walk(i)(x)] = λx[walk(j)(x)]]
B(**C**(**B**(=)(walk)))(walk)

The two instances of *walk* could be reduced to one using the duplicator, **W** = λfλa[f(a)(a)], which has been been put to work for reflexivization (Quine 1960, Szabolcsi 1987), but that is immaterial for present concerns. But it is remarkable that the combinators **B**, **C**, **I**, and **W** together deliver the expressive power of the λ-I calculus (i.e. the λ-calculus without vacuous abstraction).

Returning to our main question, the moral is this. Explicit quantification over times and worlds means that natural language expressions have time and world arguments, and some operators with quantificational force require those time and world arguments to be manipulated in the (logical) syntax, much like entity arguments are manipulated. With **what method** they are manipulated is not essential. Variable-ful manipulation, as in the λ-calculus, and variable-free manipulation, as in combinatory logic, can achieve the same thing. See Hendriks (1993) for a grammar of quantification that manipulates arguments using type-changing rules such as Argument Raising, Value Raising, and Argument Lowering. In contrast, implicit, i.e. meta-linguistic, quantification means that no time or world arguments are recognized in the (logical) syntax, and are therefore not manipulated therein.

This paper will mostly use the variable-ful notation and λ-abstraction, because this is what readers are probably the most familiar with. In view of the argument we have just made, the use of variables is just a matter of notational convenience, and in no way part of the claims advanced here.

3. VERBAL QUANTIFIERS OVER TIMES

For over a decade the formal semantics literature has been shifting to representing time and world arguments in Logical Form and at least abstracting over them explicitly. But here is a distinct question: among the linguistic time/world operators with quantificational content, which ones are explicit quantifiers?

Propositional attitude verbs (*know*, *believe*, *want*, etc.) are classically regarded as implicit quantifiers over accessible worlds, following Hintikka (1962) and Heim (1992). However, Stechow (2004, 2008), following Heim (2001), treats tenses, modals, and attitude expressions as generalized quantifiers that bind, respectively, a temporal argument of the verb, a world argument of the verb, and ⟨world, time⟩ argument pairs.

This paper examines hitherto unnoticed scope interactions between so-called

raising verbs and their subjects that suggest that those raising verbs are syntactically explicit quantifiers over time (or, possibly, world) arguments.

3.1. The Basic Data and Their Potential Relevance

A "raising verb" takes an infinitival clause as a complement and bears a semantic relation to the whole of the complement clause, not to its superficial subject. The superficial subject of the finite clause is promoted ("raised") from the infinitival clause. Perlmutter (1970) observed that in addition to its well-known control version, the verb *begin* also has a raising version. The possibilities below serve as proof:

(13) There began to be a commotion. (expletive subject)
(14) The paint began to dry. (non-sentient subject)
(15) Mary began to get good roles. (non-agentive subject)

The contribution of aspectual *begin* is (explicit or implicit) existential quantification over times:

(16) BEGIN χ is true at a world--time pair $\langle w,t'' \rangle$ only if there are $\langle w,t' \rangle$ and $\langle w, t''' \rangle$, $t' < t'' \leq t'''$, such that χ is not true at $\langle w,t' \rangle$, but it is at $\langle w, t''' \rangle$. (Further conditions that we do not investigate may be needed for BEGIN χ to be actually true.)

To illustrate, consider now example (1), replicated as (17), in two scenarios. The reading where the operator *only Mary* scopes above *began* is true in the first and false in the second. The reading where *only Mary* scopes below *began* is true in the second and false in the first. Non-monotonic *only* makes the two readings logically independent and easy to distinguish.

`only Mary > began'		`began > only Mary'	
Who is getting good roles...		Who is getting good roles...	
before May?	after May?	before May?	after May?
Eva: yes	Eva: yes	Eva: yes	Eva: no
Susan: no	Susan: no	Susan: no	Susan: no
Mary: no	Mary: yes	Mary: yes/no	Mary: yes

(17) In May, only Mary began to get good roles.
(i) `Only Mary is such that it began to be the case that she was getting good roles'
(ii) `It began to be the case that only Mary was getting good roles'

P. Schlenker (p.c.) observes that the Cresswellian (7) and (8) can be replicated with *begin*:

(18) At some point, John began to give good roles to everybody who had been nice to him.
(i) `... who had been nice to him before that point'
(ii) `John decided the following: Henceforth, at all times *t*, I'll give good roles to people who have been nice to me by *t*'

Our central concern will be the fact that in some languages the two readings of (17) are disambiguated by constituent order. The subject-precedes-verb order unambiguously carries the (17i) reading. I am particularly grateful to Laziz Nchare for data and discussion regarding Shupamem.

`Only DP' scopes over aspectual `began'

(19)	Csak Mari	kezdett el	jó szerepeket	kapni .	Hungarian
	only Mary	began	good roles.acc	get.inf	
(20)	Ndùù Maria	kà jɛ̀ʃə̌	jìngɛ̌t	ndàà lìʔ.	Shupamem
	only Maria	past begin	inf.have	good roles	
(21)	Tol'ko Marija	stala	prixodit'	domoj	ustaloy.	Russian
	only Mary	began	go-inf	home	tired	
(22)	Alleen Marie	begon	goede rollen	te krijgen.	Dutch
	only Mary	began	good roles	to get.inf	

In contrast, the verb-precedes-subject order carries reading (17ii), often unambiguously. In the series below, only the Dutch sentence is ambiguous.

Aspectual `begin' scopes over `only DP'

(23)	Elkezdett	csak Mari	kapni	jó szerepeket.	Hungarian
	began	only Mary	get.inf	good roles.acc	
(24)	À kà jɛ̀ʃə̌	ndùù Maria	jìngɛ̌t	ndàà lìʔ.	Shupamem
	it past begin	only Mary	inf.have	good roles	
(25)	Stala	prixodit'	domoj	tol'ko Marija	ustaloy.	Russian
	began	go.inf	home	only Mary	tired	
(26)	In mei	begon	alleen Marie	goede rollen	te krijgen.	Dutch
	in May	began	only Mary	good roles	to get.inf	

How do such data bear on the issue of explicit quantification over times?

Suppose that the right syntactic analysis is that the expression meaning `only Mary' (to be written as ONLY MARY, to facilitate the cross-linguistic discussion) is located in the main clause, and the verb meaning `began' (to be written as BEGAN) acquires scope above it by fronting. What could be the matching semantics? If BEGAN is syntactically analyzed as an operator of type α, and its "trace" is of the

same type, then we have a classical case of scope reconstruction. λ-conversion automatically puts the full semantic content of BEGAN$_\alpha$ in the position of its trace V_α (Cresti 1995, a.o.). No `BEGAN > ONLY MARY' reading is produced.

(27) λV_α [ONLY MARY(V_α (GET GOOD ROLES))] (BEGAN$_\alpha$) = ONLY MARY(BEGAN $_\alpha$ (GET GOOD ROLES))

In contrast, if GET GOOD ROLES has a first-order time argument *t* that serves as the "trace", we have a classical case of quantifying-in, and the `BEGAN > ONLY MARY' reading is produced.

(28) BEGAN$_\alpha$ (λt [...ONLY MARY … GET GOOD ROLES(t)])

For present purposes the important question is whether something like (28), the analogue of quantifying-in, ever happens. It is less important for us how scope reconstruction is handled, for nominal or verbal quantifiers. The higher-order variable solution is used for convenience.

The relevance of this reasoning is, of course, contingent on whether the above syntactic analysis is right. The next section considers some analytical possibilities for how `BEGAN > ONLY MARY' readings come about cross-linguistically.

3.2. Analytical Possibilities

3.2.1. ONLY MARY Simply Located In The Infinitival Clause?

If both the syntactic locus and the scope of ONLY MARY were in the infinitival clause, then the `BEGAN > ONLY MARY' reading would be read off the syntax, trivially. Szabolcsi (2009a, b) argues in detail that this is the correct analysis of Hungarian (23) and, plausibly, of similar data in certain other languages.

(29) BEGAN [$_{\text{Infinitival Complement}}$ ONLY MARY TO GET GOOD ROLES]

If so, then the Hungarian datum does not tell us anything about whether BEGAN binds a first-order time argument within the scope of ONLY MARY. Accordingly, we do not consider this case further; it has been mentioned to underscore that the mere existence of unambiguous sentences with a `BEGAN > ONLY MARY' reading does not necessarily indicate that we have an interesting semantic problem—although it may indicate that we have an interesting syntactic problem, given that overt nominative subjects in infinitival complements are not quite usual, e.g. **It/there began only women to get good roles* is ungrammatical in English.

Shupamem and Dutch provide no evidence that the surface position of ONLY MARY in (24) and (26) is inside the infinitival clause; if anything, there is evidence to the contrary; the same holds of course for English. Fortunately, Shupamem is an SVO language with reasonably rigid word order. The subject is preceded by the verb only in the *à*-focus construction, and in such sentences the subject cannot be immediately preceded or followed by anything that might indicate that it is infinitive-internal. It seems safe to conclude that the only relevant differ-

ence between (20) and (24) is that the latter involves verb fronting. So Shupamem, Dutch, and English may raise an interesting semantic question. This paper focuses on Shupamem, where the unambiguity of surface structure makes for a simpler case.

The status of Russian (25) is debatable. *Tol'ko Marija* `only Mary' in (25) may be inside the complement clause, in which case the construction is like the Hungarian one. Alternatively, the mingling of *tol'ko Marija* with complement material may be a result of rightward scrambling, as Polinsky (2008) has argued for other examples. The scrambling analysis entails that both the subject *tol'ko Marija* and whatever linearly follows it (here the secondary predicate predicate *ustaloy* `[in a] tired [state]') are located in the main clause. Polinsky does not discuss the scope effects of rightward scrambling, so further research is needed; but the Russian data may raise similar questions as Shupamem.

3.2.2. Semantically Vacuous Verb Movement Plus Subject Reconstruction?

Could Shupamem (24) be accounted for by assuming that verb fronting has no semantic effect, and the `BEGAN > ONLY MARY' reading is simply due to the reconstruction of ONLY MARY into the infinitival clause? (20) and (24) are both unambiguous. Therefore the assumed reconstruction would be taking place if and only if the matrix verb is fronted. In (20′)-(24′) strike-out indicates that the expression occupied that position in the course of the derivation but is not pronounced there. Bold face indicates the position where it is interpreted.

In (20′) both critical expressions are interpreted where they are pronounced. According to the analysis under consideration, in (24′) neither is.

(20′)		**Ndùù**	**Maria**	**kà**	**jɛ̀ʃə̌** jìngɛ̌t	~~**ndùù Maria**~~	ndàà lìʔ.
		only	**Maria**	**past**	**begin** inf.have	~~only Mary~~	good roles
(24′)	À kà jɛ̀ʃə̌	ndùù	Maria	~~**kà jɛ̀ʃə̌**~~	jìngɛ̌t	~~**ndùù Maria**~~	ndàà lìʔ.
	it past begin	only	Maria	~~**past begin**~~	inf.have	~~**only Maria**~~	good roles

It would be extremely unusual (to my knowledge, unheard of) for subject reconstruction to be tied to the overt movement of another expression in the above manner. The only reason I can imagine for this situation to obtain is if subject reconstruction is in principle optional, but the well-formedness of overt verb fronting requires that it take place. For example, the relation between the fronted verb and its trace (its unpronounced copy) might be blocked by the scopal intervention of ONLY MARY. But this is not likely to be the case, at least not in general. It is useful to consider Dutch here. Dutch (26) also involves verb fronting, specifically, the operation of "verb second" (V2), characteristic of main clauses. It seems reasonable that if verb fronting in Shupamem were blocked by an intervening operator subject, then V2 ought to be blocked by it as well. But it is not, judging by the fact that Dutch (26) is ambiguous. If *alleen Marie* obligatorily reconstructed into the infinitival clause, as indicated in (26′), it would disambiguate (26), incorrectly. This argument per se is neutral as to whether V2 in Dutch has a scopal effect.

(26′) In mei begon alleen Marie ~~**begon**~~ ~~**alleen Marie**~~ goede rollen te krijgen.

In sum, the account of Shupamem (24) has to be such that the wide scope of fronted BEGIN over ONLY MARY is not achieved solely by reconstructing ONLY MARY. It has to be compatible with ONLY MARY being interpreted in its normal main-clause subject position. Consequently, the scope effect must be due to the fact that the verb is fronted across the subject.

3.2.3. Semantically Significant Head Movement

The conclusion that verb fronting (head movement) can be semantically significant is rather new. Bittner (1993) assumes that head movement always reconstructs; she uses a higher-order variable in the formalization to achieve that effect. Stechow (2009) likewise assumes that head movement reconstructs. In fact, the possibility that head movement may have a scope effect has not been investigated until very recently. To my knowledge, Lechner (2006, 2007) is the first to argue that it does, in connection with the split scope readings of quantifiers interacting with modals (see section 4).

Incidentally, the fact that the head movement under consideration happens in overt syntax does not make it unusual for it to have a scope effect. A large body of literature shows that overtly moved quantifier phrases in Hungarian take scope in their landing site positions. Likewise, English negative fronting has scope effects (e.g. *No meal did he ever miss*), even though much of the scope-taking action in English does not visibly reorder constituents.

An interesting question arises in connection with how our particular instance of head movement acquires its scope effect. Semantically speaking, raising verbs are reminiscent of adjuncts. BEGIN modifies tense, SEEM provides evidential information, and so on. So one might suppose that BEGIN can simply be inserted in alternative positions, and always take scope where inserted. Or, that it might be inserted in its regular position following the subject, but its fronting might not leave a trace or copy (assuming that our syntactic theory generally makes use of traces or copies, as opposed to function composition or other variable-free devices). Or, that if it does leave a trace or copy, that trace or copy might be deleted. BEGIN would effectively behave as if it had never been in its low position. If these possibilities are real, then BEGIN may actually be a syntactically opaque modifier like modal logical ◊.

As far as I can see, the arguments against this treatment are syntactic. Even if semantically BEGIN is a modifier, an adjunct, syntactically speaking it has all the trappings of a finite verb. It selects a complement (the infinitival clause). It enables that clause to co-occur with matrix tense (past tense morphology does not by itself combine with a clause whose verb is expressly infinitival). It teams up with tense to license nominative case on the subject. These are typical verbal behaviors, and moreover they are thought to require particular syntactic configurations. So syntactically BEGIN is not an adjunct. What remains is the possibility that the fronting of BEGIN acquires its semantic significance because its trace or copy is deleted. It is probably possible to set up the grammar to work that way. But

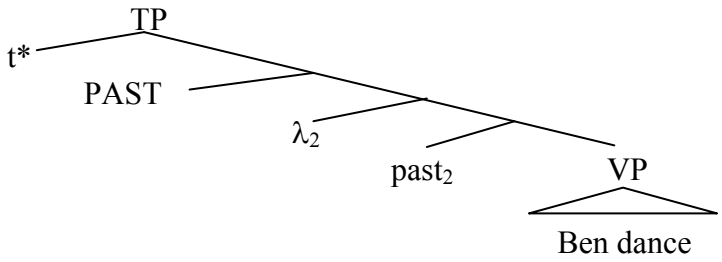
traces or copies of moved phrases are normally not deleted, and I am not aware of syntactic arguments to the effect that traces or copies of moved heads are different in this regard. If verb fronting is actually phrasal movement, an analysis that has some popularity in the literature, then it is even more likely that the traces or copies should be treated as other phrasal traces or copies.

In sum, it seems to me that treating BEGIN in analogy to ◊ would require either an isolated syntactic stipulation or a general innovation in syntactic theory. In this paper I will not invoke either of these, rather, stay with the standard assumptions. If our syntactic theory has movement that generally leaves traces/copies and those are not deleted, I assume the same applies to verb movement. I thank M. Baltin, A. Marantz, and P. Schlenker for discussion on these points.

3.3. The Basic Analysis

Following Stowell (1995a,b), Kusumoto (2005, pp. 334-336) analyzes past tense in English as follows. The subject originates inside VP, which roughly corresponds to a sentence radical. Besides its individual arguments, the verb has a time argument (written as variable *t*, of type *i*) and a world argument (variable *w*, of type *s*). Past morphology (written as *past*) originates in the T(ense) head and introduces a free time variable; essentially, event time. Existential quantification over times is due to the silent operator PAST that expresses an ordering relation between event time and the evaluation time. In a matrix sentence this is the speech time *t** provided by the context, introduced in the highest position in TP.

(30)



(31)

Ben dance	⇒	$\lambda t\, \lambda w\, [dance(b)(t)(w)]$
$past_2$	⇒	t_2
PAST	⇒	$\lambda P\, \lambda t\, \lambda w\, \exists t''[t'' < t \wedge P(t'')(w)]$
		where *P* is a variable of type $\langle i, \langle s,t\rangle\rangle$.

The resulting interpretation for (30) is as follows:

(30′) $\lambda w\, \exists t''[t'' < t^* \wedge dance(b)(t'')(w)]$

Aspectual BEGIN has the same type as Stowell's and Kusumoto's PAST. (17) can be spelled out as follows:

(32) BEGIN ⇒ $\lambda P\, \lambda t''\, \lambda w\, \exists t'\, \exists t'''\, [t' < t'' \leq t''' \wedge \neg P(t')(w) \wedge P(t''')(w)]$

From now on I will ignore the world argument.

BEGAN is the result of by V-to-T movement. The interpretation of the complex head BEGAN can be spelled out by function-composing lifted $past_2$ with BEGIN. *Q*, like *P*, is of type ⟨i, ⟨s,t⟩⟩. The reader should note that the λ-expressions below are translations into a logical language, not LFs, and so functions always precede the arguments they apply to.

(33) $lift(\text{past}_2) \circ \text{BEGIN} \Rightarrow \lambda Q_{\langle i, \langle s,t\rangle\rangle}[\lambda P_{\langle i, \langle s,t\rangle\rangle}[P(t_2)](\text{BEGIN}(Q))]$
$= \lambda Q[\text{BEGIN}(Q)(t_2)]$

Let us now turn to the Shupamem examples. We first consider the SVO order. ONLY MARY is quantified in above BEGAN and below PAST:

(34) Ndùù Maria **kà jɛ̀ʃə̌** jìngɛ̌t ndàà liʔ.
only Maria past begin get.inf good roles
`ONLY MARY > BEGAN'

(35) PAST (λt_2 [ONLY MARY (λx [$lift$(**past₂**) ∘ **BEGIN** (λt [GET ROLES(x) (t)])])]) (t*)

Now consider the V-fronting order. In line with the discussion above, the career of BEGAN always starts as in (34)-(35). When BEGAN is fronted, its position in the head of TP is occupied by its trace, a first-order time variable, notated as t_1, to be abstracted over right below its landing site, i.e. the surface position of the fronted verb. The scope of ONLY MARY is underlined in (37).

(36) À kà jɛ̀ʃə̌ ndùù Maria __ jìngɛ̌t ndàà lìʔ.
it past begin only Maria get.inf good roles
`BEGAN > ONLY MARY'

(37) PAST(λt_2 [$lift$(**past₂**) ∘ **BEGIN** (λt_1[ONLY MARY
($\underline{\lambda x\ [\lambda t\ [\text{GET ROLES}(x)(t)]\ (t_1)\ ]\ )}$])]) (t*)

Putting these ingredients together (still ignoring the world arguments for readability), we get the following translation:

(38) $\exists t''[t''<t^* \wedge \exists t'\ \exists t'''\ [t'< t''\leq t''' \wedge$
$\wedge \neg$ ONLY MARY (λx [GET ROLES(x)(t')]) $\wedge$
$\wedge$ ONLY MARY (λx [GET ROLES(x) (t''')])]]

The same analysis could be implemented using the apparatus of Heim and Kratzer (1998), Fox (2002), or in the variable-free frameworks of Szabolcsi (1987, 1992), Jacobson (1999), and Steedman (2000).

3.4. Brief Comments On Scope Reconstruction In Dutch And English

The goal of this paper is to investigate a problem in its simplest form, hopefully represented by Shupamem. But at least brief remarks on Dutch and English are in order. The relevant examples are repeated below.

(39) In mei begon alleen Marie goede rollen te krijgen.
in May began only Mary good roles to get.inf
(i) `BEGAN > ONLY MARY'
(ii) `ONLY MARY > BEGAN'

The simplest assumption is to derive reading (i) in analogy to Shupamem (34)-(35), and to appeal to scope reconstruction, i.e. a variable *T* of same type as $past_2 \circ$ BEGIN, for the trace of movement, for reading (ii).

(40) PAST (λt_2**[**λT[ONLY MARY (λx [T (λt [GET ROLES(x) (t)])])] (**$past_2 \circ$ BEGIN**)]) (t*)

If this turns out to be the correct analysis of (39ii), then we may conclude that our verbal quantifiers take scope using basically the same mechanisms as nominal quantifiers, although their specific syntax restricts the actual liberties that they may take. An alternative explanation of the ambiguity of (39) may be that ONLY MARY optionally reconstructs into the infinitival clause.

English does not have any overt verb fronting corresponding to reading (i). Here ambiguity occurs in the subject—verb order. One possibility is that reading (i) is due to covert verb fronting (an analog of the covert scope shifting operation QR), whereas reading (ii) is derived without further ado:

(41) In May, only Mary began to get good roles.
(i) `began > only Mary'
(ii) `only Mary > began'

The other possibility is that scope reconstruction of *only Mary* is at work in (i), as much of the literature on English has it for (42), starting at least with May (1985).

(42) A hippogryph is likely to be apprehended.
OK `likely > a hippogryph'

The fact that in (43) politicians may vary with rallies is taken to be diagnostic of the *some politician* being interpreted inside the infinitival clause.

(43) Some politician is likely to address every rally.
OK `likely > every rally > some politician'

I am not sure though what prevents *every rally* from scoping from the infinitival complement into the matrix clause; that would derive the above reading without

reconstruction. In any case, a parallel reading is available with *begin* in (45). I thank B. Partee for help with the examples.

(44) Only Mary fell asleep every day.
OK `every day > only Mary fell asleep'

(45) In June, only Mary began to fall asleep every day.
OK `began > every day > only Mary fell asleep'

While the ability of main-clause-subject weak quantifiers (existentials) to scope below the intensional raising verbs is widely acknowledged, the case of strong quantifiers has been a matter of debate. See Lasnik (1999) and Lechner (2006, 2007), among others. It is therefore of some interest to observe that besides *only DP*, also *every NP* and *most NP* easily scope below *begin*. The following naturally occurring examples, from Google, only make sense on that reading:

(46) Every step began to be a struggle.
(47) When every game began to be televised on CBS … it dulled the interest in the final game.
(48) Over 50 percent of my goats began to be born with birth defects.
(49) Beginning with AbrahamDarby's bridge … in 1779, most bridges began to be built of cast and wrought iron.

The data in (45)-(49) may suggest that subject reconstruction into the infinitival complement is in fact not restricted to weak quantifiers, and the counterexamples discussed in the literature have independent explanation. However, it goes beyond the scope of this paper to pursue this matter further.

3.5. Summary

I started this section with the observation that the fronting of a finite aspectual raising verb, such as BEGAN, across a quantificational subject, such as ONLY MARY, unambiguously reverses their relative scope in Shupamem. I then argued that the most straightforward analysis of this data is one that assimilates the effect of V-fronting to overt quantifying-in, familiar from the individual domain. On this analysis BEGAN is a verbal quantifier that binds a first-order time argument of the verb within the scope of the subject. This kind of scope interaction can therefore be added to the battery of tests that diagnose syntactically explicit quantification over arguments of a particular type – in this case, times.

4. VERBAL QUANTIFIERS OVER WORLDS?

Epistemic modal auxiliaries, such as *must* and *can*, and gradable modal predicates, such as *probable* and *likely*, are standardly analyzed as quantifying over possible worlds (although see Lassiter (2011) for a scalar predicate analysis,

where the scale associated with the adjectival epistemic modals is ordinary probability). This section makes some preliminary steps towards finding out whether scope interaction with the subject is exhibited by modals and intensional raising verbs. In this domain even the descriptive picture is much less clear. Some but not all modals exhibit interaction; intensional raising verbs generally do not. This section does not reach a conclusion; it resorts to highlighting some data for further research.

4.1. Modals

To my knowledge Lechner (2006, 2007) was the first to argue systematically that head movement may have interpretive effects. He makes this claim specifically for the covert head movement of *can* and *need* in the analysis of "split de dicto" readings, as in (50).

(50) Not every boy can make the basketball team.
split de dicto
$\lambda w \neg \exists w' \forall x[[boy(x)(w') \wedge Acc(w)(w')] \rightarrow make_the_team(x)(w')]$

This reading is distinct from the simple de dicto one, which is perhaps more easily available with *may* than with *can*:

(51) Not every boy may / ?can make the basketball team.
de dicto
$\lambda w \exists w' \neg \forall x[[boy(x)(w') \wedge Acc(w)(w')] \rightarrow make_the_team(x)(w')]$

Lechner analyzes *can* as an explicit existential quantifier that leaves a trace of type *s* (worlds) when it covertly moves.

Likewise Homer (2009) notes the need for either subject reconstruction or covert movement of the modal past both the indefinite and negation in (52):

(52) [Context: The rules of this bowling game state that exactly one pin must remain standing, no matter which one. . .]
Exactement une de ces quilles ne doit[*deont*] pas être
exactly one of those pins neg must-present neg be
renversée.
knocked.down
'Exactly one of those pins mustn't be knocked down.'
`must[*deont*] > exactly one > not'

Readings where the auxiliary takes scope over the subject are available with epistemic *must* and *could*, though according to my informants not with epistemic *may* or *might*:

(53) [Seeing the lights on in all the windows of a big apartment building]
Everybody must be home.

(54) [Hearing loud music when we know that Mary's roommates hate loud music]
Only Mary must be home.

The effects of the overt fronting of BEGIN are replicated with CAN in Shupamem; both examples are unambiguous (L. Nchare, p.c.).

(55) Ndùù Maria **jɛ̀tnə̌** jìngɛ̌t ndàà liʔ.
only Mary can inf.have good role
`Only Mary is such that she can get good roles'

(56) **À** **jɛ̀tnə̌** nà ndùù Maria __ jìngɛ̌t ndàà liʔ.
it can accompl only Mary inf.have good role
`It is possible that only Mary gets good roles'

4.2. Intensional Raising Verbs?

Having seen that at least some modals interact with subjects in the manner of the aspectual raising verb *begin*, let us ask whether intensional raising verbs do. I will restrict my attention to strong quantifiers, to control for the possibility, advocated in Lasnik (1999), that the low scope of indefinites comes about in some special way.

Intensional raising verbs are cross-linguistically rarer than aspectual raising verbs or modals; in many languages the relevant predicates do not take infinitival complements: their complements are either indicative or subjunctive finite clauses or small clauses/secondary predicates. English and Dutch offer some test cases.

The verb *seem* is not a particularly good test case, because the two readings are equivalent or at least extremely hard to distinguish:

(57) Only Mary seems to be tall.
(i) `Only Mary is such that she seems to be tall'
(ii) `It seems that only Mary is tall'

B. Partee (p.c.) points out that both readings may be discernible with *appear* in a context involving visual clues: here (i) is non-sensical but (ii) makes sense:

(58) Only Mary appears to be missing.
(i) `Only Mary is such that she appears to be missing'
(ii) `It appears that only Mary is missing'

The verbs *threaten* and *promise* are possibly more useful, although their cross-linguistic utility is unfortunately limited: few languages possess the relevant raising versions. I assume that their rough semantics is this:

(59) Raising *threaten* asserts: the complement is likely to be true
presupposes: it is bad if the complement is true

(60) Raising *promise* asserts: the complement is likely to be true
presupposes: it is good if the complement is true

These presuppositions make *threaten* and *promise* potentially good diagnostic tools, because varying the relative scope of the subject can make the reading pragmatically reasonable or weird. For example, (61) has a pragmatically reasonable reading (i): it would indeed be bad news for the owner of if a building collapsed. It could have, but in fact lacks, the weird reading (ii) that presupposes that it would be bad news for the owner if only the barn collapsed and the fortess did not, as the # indicates.

(61) [Context: The speaker owns a barn and a fortress, and would naturally consider it bad news if they collapsed.]
Only the barn threatened to collapse.
(i) OK `Only the barn was such that the threat was that it would collapse' (reasonable)
(ii) # `The threat was that only the barn would collapse'(weird)

This indicates that *threaten* does not scope over its surface subject. The suspicion might arise that the pragmatic weirdness of that reading interferes. This can be eliminated by replacing the flimsy barn with the robust fortress, and collapse with survival. Consider:

(62) Only the fortress threatened to survive.
(i) OK `Only the fortress is such that the threat is that it will survive' (weird)
(ii) # `The threat is that only the fortress will survive' (reasonable)

The scope judgments remain the same. Now only the weird reading is available.

Interestingly, Dutch has a verb like English *threaten*, and it seems to interact with the subject in the same way as aspectual *begin*. I thank J. Groenendijk, M. den Dikken, J. Hoeksema, and H. de Swart for judgments.

(63) Alleen de schuur dreigde te bezwijken.
only the barn threatened to collapse.inf
(i) OK `Only the barn is such that the threat is that it will collapse' (reasonable)
(ii) # `The threat is that only the barn will collapse' (weird)

(64) In mei dreigde alleen het fort overeind te blijven.
in May threatened only the fortress to survive.inf
(i) OK `Only the fortress is such that the threat is that it will survive' (weird)

(ii) OK `The threat is that only the fortress will survive' (reasonable)

As was observed in section 3.4, the Dutch data are consistent with two kinds of analysis. One involves semantically significant verb fronting for the (i) readings and scope reconstruction thereof for the (ii) readings; the other involves no semantic effect for verb fronting but optional reconstruction of the subject into the infinitival clause. Reconstruction would seem free, unless the subject occurs in first position in the main clause, as in (22), *Alleen Marie begon goede rollen te krijgen*, and in (63), *Alleen de schuur dreigde te bezwijken*. The latter analysis does not conflict with the modest conclusion drawn from the Dutch data in section 3.2.2. On the other hand, the contrast between English and Dutch remains a mystery. Whether the `began > only DP' readings in English are due to covert quantifying-in of the verb or to subject reconstruction, that option seems unavailable for the creation of `threaten > only DP' readings.

To summarize, the results reported in section 4 are very preliminary. We have seen that some though not all modals interact scopally with quantificational subjects. On the other hand, evidence concerning intensional raising verbs is more difficult to come by. It is not yet clear what the natural classes are, and what the data tell us about syntactically explicit quantification over worlds. It may even be possible that the data are suggestive of a difference in the quantificational vs. scalar character of these predicates; see Lassiter (2011), although his analysis does not draw a demarcation line between epistemic adjectives and auxiliaries. These questions await further research.

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