

QUANTIFICATION IN ESKIMO:
A CHALLENGE FOR COMPOSITIONAL SEMANTICS

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In (West Greenlandic) Eskimo, as in English, quantificational expressions fall into two syntactic classes. In English, paradigm examples of one class are adverbs of quantification (AQ) eg. always, mostly, never ; while the other class is represented by quantificational determiners like every, most, no. Following Partee et al. (1987), I refer to these two classes as A-quantifiers and D-quantifiers, respectively. Syntactically, an A-quantifier forms a constituent with some projection of V (1a), whereas a D-quantifier is, or forms a constituent with, a projection of N (1b).

- (1)
- a. A quadratic equation [_{VP} usually [_{VP} has two solutions]].
 - b. [_{DP} Most [_{NP} quadratic equations]] have two solutions.

Quantifiers of either type can be restricted by bare or indefinite NP's, as in (1). In addition to that, an A-quantifier can be restricted by an if- or when-clause (2), and a D-quantifier, by a relative clause (3a) or a dislocated PP (3b).

- (2) [_{CP} When a boy gets a balloon], he almost always breaks it within ten minutes.

- (3)
- a. Almost every boy [_{CP} who gets a balloon] breaks it within ten minutes.
 - b. [_{PP} Out of fifty boys who got a balloon], forty seven broke it within ten minutes.

In sections 1 and 2 of this study, I describe the basic construction types for expressing A- and D-quantification in Eskimo. The quantificational structures in this heavily polysynthetic language are of empirical as well as theoretical interest, because their surface constituent structure is very different from that of their English equivalents and poses a difficult challenge for compositional semantic analysis. The issue of compositionality is addressed in section 3.

1. A-QUANTIFIERS IN ESKIMO.

In (West Greenlandic) Eskimo¹, A-quantification can be expressed in two ways. One is by means of a suffix on the verb, eg. -tuaannangajap in (4). Other suffixal A-quantifier include -tuaannar 'always', -gajug 'often', and -nngisaannar 'never'.

- (4) Nukappiaraq balloni-si-gaangga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 minuttit qulit naatinnagit qaartuur-tuaanna-ngajap-p-a-a.
 minutes ten within break-always-almost-IND-[+tr]-3s₁.3s₂
 'When a boy gets a balloon, he almost always breaks it within ten minutes.'

More commonly, A-quantification is expressed by the combination of the suffix -tar construed with an AQ — eg. tamanngajatigut in (5), where the construal relation is indicated by coindexation. Other AQ's which can be construed with -tar are: tamatigut 'always', amirlanirtigut 'usually', akulikitsumik 'often', ilaannikkut 'sometimes', qaqutigut 'rarely', etc. Semantically, the combination of the suffix -tar with a coindexed AQ is interpreted as a single quantifier whose quantificational force is determined by the AQ, while the scope is constrained by the suffix.

- (5) Nukappiaraq balloni-si-gaangga-mi
 boy ABS₁ balloon₂-get-when.iter-3SPROX₁
 minuttit qulit naatinnagit tama-ngaja-tigut qaartuur-tar-p-a-a.
 minutes ten within all-almost-AQ₃ break-TAR₃-IND-[+tr]-3s₁.3s₂
 'When a boy gets a balloon, he almost always breaks it within ten minutes.'

¹ West Greenlandic Eskimo is a head final language with an ergative case system. A word consists of a stem, any number of derivational suffixes, inflection, and optional clitics. Nouns inflect for number and case (ABS, ERG, DAT, INS, LOC, ABL, VIA); if possessed, also for the person and number of the possessor. Verbs inflect for mood (indicative, interrogative, imperative, etc.) and the person and number of any non-oblique argument NP—i.e. of the ABS subject, if the verb is intransitive (i); and of the ERG subject as well as the ABS object, if the verb is transitive (ii). NP's which trigger agreement—i.e. possessors, subjects, and objects—are freely "pro dropped". In the indicative mood, the verb also inflects for transitivity.

(i) *Jaaku aallar-p-u-q.*
 J-ABS₁ leave-IND-[-tr]-3s₁
 'Jaaku left.'

(ii) *Aani-p Jaaku patip-p-a-a.*
 A-ERG₁ J-ABS₂ hit-IND-[+tr]-3s₁.3s₂
 'Aani hit Jaaku.'

The language has an obviation system so that, in dependent clauses, the agreement indicates whether the agreeing argument is coreferent (eg. '3s.PROX') or noncoreferent ('3s.OBV') with a c-commanding subject.

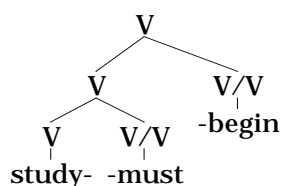
The evidence that the suffix -tar is a scope marker comes from sentences with complex verbs containing other scope-taking suffixes. Before we discuss the evidence concerning -tar, a few remarks are in order about the scope of such suffixes in general.

The general rule is that an operator suffix in Eskimo includes in its scope everything that it c-commands in the tree which represents the morphological structure of the word containing that suffix. For the suffix -ngajap 'almost' in (4), this means just the immediately preceding AQ suffix -tuaannar 'always'. More commonly, however, an operator suffix will c-command every morpheme to its left and none to its right, because a typical word structure in Eskimo is uniformly left branching. For instance, in (6a), the aspectual suffix -lir takes scope over the modal -tariaqar, whereas the opposite is true in (7a). The corresponding tree representations are given in (6b) and (7b), respectively.

(6)

- a. atuar-tariaqa-lir-p-u-q
 study-must-begin-IND-[-tr]-3s
 'He began to have to study.'

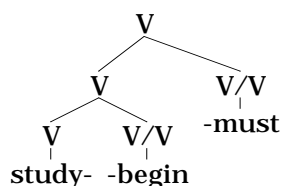
b.



(7)

- a. atua-lir-tariaqar-p-u-q
 study-begin-must-IND-[-tr]-3s
 'He had to begin to study.'

b.



In addition to the morphemes which it c-commands in the morphological structure of the word, an operator suffix can include in its scope certain syntactic constituents. For instance, my Eskimo consultant accepted (8) as a well-formed sentence and judged it equivalent to (9). I conclude from these judgements that, in (8), the propositional attitude suffix -nirar takes scope over the modal adverb immaqa².

² In absence of the wide scope modal *qularnannngitsumik* 'undoubtedly' which forces *immaqa* 'maybe' to take narrow scope, the latter modal may take either wide or narrow scope with respect

- (8) Qularnanngitsumik Jaaku-p Aani immaqa qasu-nirar-p-a-a. ≡ (9)
 undoubtedly Jaaku-ERG₁ Aani-ABS₂ maybe tired-say-IND-[+tr]-3s₁.3s₂
- (9) Qularnanngitsumik Jaaku uqar-p-u-q:
 undoubtedly J-ABS₁ say-IND-[-tr]-3s₁:
 "Aani immaqa qasu-v-u-q."
 "A-ABS₂ maybe tired-IND-[-tr]-3s₂."
 'Jaaku undoubtedly said: "Maybe Aani is tired." '

In (10a) and (10b), the AQ suffix *-tuaannar* ~ *-juaannar* 'always' includes in its scope the dependent clause marked by the inflection *-gaannga* 'when (iterative)', which restricts its domain of quantification. In addition to that, the informants' judgements about the diagnostic scenarios in (11) show that the scope of the AQ suffix is constrained by its position in the word. As expected, the suffix always has the option of taking scope over everything to its left in the same word. Somewhat surprisingly, in (10b), it is also permitted to take scope over the immediately following propositional attitude suffix *-nirar* 'say' — suggesting that the morphological structure of the verb in this sentence need not be uniformly left branching.

- (10)
- a. siurna Jaaku unammi-gaannga-t
 last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
 Anna-p ajugaa-nirar-tuaannar-p-a-a = 11a,*b
 Anna-ERG₁ win-say-always-IND-[+tr]-3s₁.3s₂
- b. siurna Jaaku unammi-gaannga-t
 last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
 Anna-p ajugaa-juaannar-nirar-p-a-a = 11a, b
 Anna-ERG₁ win-always-say-IND-[+tr]-3s₁.3s₂

(11) Scenarios:

- a. Last year, whenever Jaaku participated in a competition, Anna always said:
 "He has won." '
- b. Last year, Anna said (once): "Whenever Jaaku participates in a competition,
 he always wins."

I now turn to the evidence that, in quantificational structures involving an AQ construed with the suffix *-tar*, the suffix functions as a scope marker. The evidence comes from the fact that Eskimo informants judge sentences like (12a) and (12b) to be equivalent to (10a) and (10b), respectively — as can be seen eg. by comparing the judgements about the scenarios from (11).

(12)

- a. siurna Jaaku unammi-gaannga-t
 last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
 Anna-p tama-tigut ajugaa-nirar-tar-p-a-a = 11a, *b
 Anna-ERG₁ all-AQ₃ win-say-TAR₃-IND-[+tr]-3s₁.3s₂
- b. siurna Jaaku unammi-gaannga-t
 last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
 Anna-p tama-tigut ajugaa-sar-nirar-p-a-a = 11a, b
 Anna-ERG₁ all-AQ₃ win-TAR₃-say-IND-[+tr]-3s₁.3s₂

This shows that, in (12a) and (12b), the combination of the AQ *tamatigut* in construal with the suffix *-tar* is interpreted as a single quantifier of type A — on a par with the A-quantifier suffix *-juaannar* ~ *-juaannar* in (10a) and (10b). The quantificational force of this quantifier is universal, determined by the AQ, whereas the scope does not depend on the position of the AQ, but is constrained by the position of the suffix *-tar* in the same way as the scope of the corresponding suffixal A-quantifier in (10a) and (10b). Judging by the data available so far, constraining the scope of the A-quantifier expressed by the combination AQ_i ...*-tar_i* is the only semantic contribution of the suffix *-tar* in split quantificational structures of this form.

Syntactically, the suffix *-tar* also serves as a licensing element for the AQ component of a split quantifier. Sentences containing an AQ but no *-tar* are ungrammatical (13)-(14).

- (13) Nukappiaraq balloni-si-gaannga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 qaqtigu-rujussuaq qaartuur-tar-p-a-a.
 rarely-very₃ break-TAR₃-IND-[+tr]-3s₁.3s₂
 'When a boy gets a balloon, he very rarely breaks it.'

- * (14) Nukappiaraq balloni-si-gaannga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 qaqtigu-rujussuaq qaartuur-p-a-a.
 rarely-very₃ break-IND-[+tr]-3s₁.3s₂

By contrast, the suffix -tar may occur without any overt AQ, as in (15). The sentence is then interpreted as if it contained an A-quantifier with the universal, or perhaps generic, force, whose scope is determined by the position of -tar in the usual manner.

- (15) Nukappiaraq balloni-si-gaannga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 qaartuur-tar-p-a-a.
 break-TAR₃-IND-[+tr]-3s₁.3s₂
 'When a boy gets a balloon, he breaks it.'

In this respect, the behaviour of the Eskimo -tar is reminiscent of the complementizers if and (generic) when in English. All of these elements indicate the presence of a possibly implicit A-quantifier, because they cannot be interpreted without one: the Eskimo -tar is only interpretable as a scope marker for an A-quantifier; while the role of an English if-clause or (generic) when-clause is to restrict one. In both languages, the quantificational force of the quantifier can be specified explicitly by means of an AQ — i.e. usually, rarely, never, etc — as in (13). And in both languages, the sentence minus the AQ — here, (15) — is still grammatical and is interpreted as if it contained an AQ with the universal or generic force. Since Eskimo and English are genetically unrelated and typologically very different, this cross-linguistic pattern illustrated in (13) and (15) — by the Eskimo sentences and their English translations — is likely to be characteristic of A-quantification in natural languages in general.

2. D-QUANTIFIERS IN ESKIMO.

D-quantifiers in Eskimo are words and phrases which typically contain the same stem as the corresponding AQ's. But instead of an adverbial ending -tigut, -kut or -mik³, the stem is inflected like a noun, eg. in (16), for plural number and dative case.

(16) <u>AQ</u>		<u>D-quantifier (p.DAT)</u>	
tama-tigut	'always'	tama-nut	'to all'
amirlanir-tigut	'mostly'	amirlanir-nut	'to most'
akulikitsu-mik	'often'	amirlasu-nut	'to many'
ilaanni-kkut'	sometimes'	ilaan-nut	'to some'
qaqu-tigut	'rarely'	ikittu-nut	'to few'

³ Etymologically, these endings are case markers: -tigut ~ -kkut of the vialis case (roughly equivalent to 'through, by'); -mik, of the instrumental case.

As in English, the domain of quantification of a D-quantifier is generally determined by contextual information (17), a nominal constituent which is sister to the quantifier, a relative clause (18), or a topicalized oblique phrase (19).

- (17) Tama-ngaja-rmik balloni-si-sima-pp-u-t.
 all-almost-ABS₁ balloon-get-perf-IND-[-tr]-3p₁
 Lit. 'Almost all got a balloon.'
- (18) Nukappiaqqat tama-nngaja-rmik balloni-si-sima-s-u-t
 [[boys-ABS all-almost-ABS] balloon₂-get-perf-PRT-[-tr]-p.ABS]₁
 minuttit qulit naatinnagit qaartuur-p-a-at. = 22a, *b
 minutes ten within break-IND-[+tr]-3p₁.3s₂
 '[Almost all the boys who got a balloon₂]₁ broke it₂ within ten minutes.'
- (19) Nukappiaqqa-nit balloni-si-sima-s-u-nit
 [boys-ABL balloon₂-get-perf-PRT-[-tr]-p.ABL]
 tama-ngaja-rmik minuttit qulit naatinnagit qaartuur-p-a-at. = 22a, *b
 all-almost-ERG₁ minutes ten within break-IND-[+tr]-3p₁.3s₂
 '[Out of the boys who got a balloon₂], almost all₁ broke it₂ within ten minutes.'

And as in English, D- and A-quantifiers with the same quantificational force differ in that the D-quantifier counts individuals, whereas the corresponding A-quantifier counts something more like "cases" (Lewis 1975). For instance, when presented with the scenarios in (22) (with English headings replaced by their Eskimo equivalents) my Eskimo consultants consistently judged (18) and (19) true in (22a) and false in (22b), whereas the judgements were reversed whenever D-quantification was replaced with A-quantification, eg. in (20) and (21).

- (20) Nukappiaraq balloni-si-gaannga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 minuttit qulit naatinnagit qaartuur-tuaanna-ngajap-p-a-a. = 22*a, b
 minutes ten within break-always-almost-IND-[+tr]-3s₁.3s₂
- (21) Nukappiaraq balloni-si-gaannga-mi
 boy-ABS₁ balloon₂-get-when.iter-3SPROX₁
 minuttit qulit naatinnagit tama-ngaja-tigut qaartuur-tar-p-a-a. = 22*a, b
 minutes ten within all-almost-AQ₃ break-TAR₃-IND-[+tr]-3s₁.3s₂

(22)

a.	Boy	Balloons he got	Balloons he broke within 10 minutes
	Jaaku	100	0
	Piita	100	1
	Jensi	1	1
	Tuuma	1	1
	David	1	1
	<u>Karl</u>	<u>1</u>	<u>1</u>
	6	204	5
b.	Jaaku	100	100
	Piita	100	100
	Jensi	1	0
	Tuuma	1	0
	David	1	0
	<u>Karl</u>	<u>1</u>	<u>0</u>
	6	204	200

From these judgements, I conclude that the Eskimo speakers I consulted interpret (18) and (19) as equivalent to (23a), and (21) and (22) as equivalent to (23b) —in agreement with the general hypothesis that D-quantifiers quantify over individuals whereas A-quantifiers effectively quantify over "cases" in the sense of Lewis (1975).

(23)

- a. For almost all individuals x , if x is a boy who got at least one balloon,
then, for some y , y is a balloon, x got y at t , and x broke y within 10 minutes of t .
≡ (18), (19)
- b. For almost all triples $\langle x, y, t \rangle$, if x is a boy, y is a balloon, and x got y at t ,
then x broke y within 10 minutes of t .
≡ (20), (21)

Furthermore, just like English, the contrast between D- and A-quantifiers, exemplified in (18)-(21), remains stable under variations in the syntactic structure. For instance, it persists when the noun incorporation construction from (18)-(21) is replaced by other construction types, as in (24a)-(26a). Here, diagnostic scenario tests analogous to (22) show that the D-quantifier in (24a)-(25a) quantifies over individuals (24c)-(25c), whereas the related A-quantifier in (26a) quantifies over "cases" (26c). The nearest English counterparts given in (24b)-(26b) conform to the same generalization.

(24)

- a. Piniartut amirlanir-it puisi-mik pisa-qar-sima-s-u-t
 [[hunters-ABS most-ABS] seal-INS₂ catch-have-perf-PRT-[-tr]-p.ABS]₁
 nulia-min-nut pilat-tit-p-a-at
 wife-selves'₁-DAT flense-cause-IND-[+tr]-3p₁.3s₂
- b. [[Most hunters] who caught a seal₂]₁ got their₁ wife to flense it₂.
- c. For most individuals x, if x is a hunter who has caught a seal,
 then, for some y, y is a seal, x caught y, and x got x's wife to flense y.

(25)

- a. Puisit amirlanir-it piniartu-mit pisari-niqar-sima-s-u-t
 [[seals-ABS most-ABS] hunter-ABL₁ catch-PASS-perf-PRT-[-tr]-p.ABS]₂
 taassuma nuli-a-nit pilan-niqar-p-u-t.
 [his₁ wife-3s₁-ABL] flense-PASS-IND-[-tr]-3p₂
- b. [[Most seals] which were caught by a hunter₁] were flensed by his₁ wife.'
- c. For most individuals y, if y is a seal which has been caught by a hunter,
 then, for some x, x is a hunter, x caught y, and x's wife flensed y.

(26)

- a. Piniartu-p puisi pisara-annga-gu
 hunter-ERG₁ seal-ABS₂ catch-when.iter-3SOBV₁.3SOBV₂
 nuli-ata amirlanir-tigut pilat-tar-p-a-a
 wife-3s₁-ERG₃ most-AQ₄ flense-TAR₄-IND-[+tr]-3s₃.3s₂
- b. When a hunter₁ catches a seal₂, his₁ wife usually flenses it₂.
- c. For most pairs <x, y>, if x is a hunter, y is a seal, and x catches y,
 then x's wife flenses y.

As already discussed, Greenlandic Eskimo has split A-quantifiers consisting of an optional AQ which determines the quantificational force, and a verbal suffix *-tar* which licenses the AQ and constrains its scope—as in (26a) and (12a, b). For D-quantification, the language also has a split construction, consisting of an optional syntactic constituent — this time an NP — contributing the quantificational force, and a verbal suffix which licenses that constituent and constrains its scope. The construction in question is the so-called antipassive — illustrated in (27b) and (29a, b) — which systematically alternates with the ergative construction —eg. (27a). For a description of simple antipassive sentences in the language, the reader is referred to Kleinschmidt (1851), Bittner (1987, 1988), and the references cited therein. In general, an antipassive sentence in Greenlandic Eskimo contains an antipassive suffix on a transitive verb stem —eg. the suffix *-(s)i* in (27b) and

(29a, b) — which licenses the instrumental case on the object of the verb — here, atuakkamik ataatsimik — and constrains the scope of that object — just like -tar does for the AQ which it licenses in split A-quantifiers, exemplified in (26a) and (12a, b).

(27) Context: "Last year, Jaaku₁ ordered five books. Yesterday, when I saw him₁,..."

- a. ...suli atuagaq ataasiq tigu-sima-nngi-la-a = 28a, b, *c
 ...yet [book-ABS one-ABS]₂ get-perf-neg-IND-3s₁.3s₂
- b. ...suli atuakka-mik ataatsi-mik tigu-si-sima-nngi-la-q. = 28*a, *b, c
 ...yet [book-INS one-INS]₂ get-APASS₂-perf-neg-IND-3s₁

(28) Scenarios:

- a. Four books have already arrived. Only Tulluartoq by Ole Brandt hasn't come yet.
- b. Four of the books have already arrived. One is still missing; I don't know which one.
- c. None of the books have arrived yet.

(29) Context: "Last year, Jaaku₁ ordered five books. Yesterday when I talked to [his₁ mother]₃..."

- a. ...suli atuakka-mik ataatsi-mik
 ...yet [book-INS one-INS]₂
 tigu-si-sima-nngi-nirar-p-a-a. = 30*a, *b, c
 get-APASS₂-perf-neg-say-IND-[+tr]-3s₃.3s₁
- b. ...suli atuakka-mik ataatsi-mik
 ...yet [book-INS one-INS]₂
 tassumunnga tigu-sima-nngi-nira-i-v-u-q. = 30a, b, *c
 him-DAT₁ get-perf-neg-say-APASS₂-IND-[-tr]-3s₃

(30) Scenarios:

- a. Jaaku's mother said: "He has already received four books. He's still waiting for Tulluartoq by Ole Brandt".
- b. Jaaku's mother said: "He has already received four books. He's still waiting for one book; I don't know which one."
- c. Jaaku's mother said: "No book has arrived yet. He's still waiting for all of them."

Thus —judging by the judgements about the diagnostic scenarios in (28) and (30), which were consistently obtained from several informants — the scope relations in the four sentences in (27) and (29) are as follows. The absolutive object in the ergative construction (27a) is restricted to take wide scope relative to negation (28a, b); whereas the scope of its instrumental counter-part in the related antipassive sentence (27b) —where the licensing

antipassive suffix *-si* precedes the negation suffix *-nngi* — is obligatorily narrow (28c). In (29a), where the antipassive suffix *-si* precedes the negation *-nngi* as well as the intensional suffix *-nirar* 'say', the instrumental object licensed by *-si* is restricted to take scope under both (30c). By contrast, in (29b), where the order of the operator suffixes is *-nngi-nira-i-* '-neg-say-APASS₂', the instrumental object licensed by *-(s)i* must take wide scope with respect to negation (*30c), but can take either wide (30a) or narrow (30b) scope with respect to the intensional suffix *-nirar* 'say'. In this respect, (29b) patterns like (10b): both sentences are ambiguous, because certain adjacent operator suffixes may take either scope with respect to each other (see Bittner 1994a for further discussion and a possible explanation).

Further evidence that the antipassive suffix constrains the scope of the instrumental NP it is construed with comes from judgements about discourse anaphora. For instance, in (31a) (cf. 27b) and (33a) (cf. 29a), the antipassive suffix, and hence the coindexed indefinite NP in the instrumental case, is in the scope of negation. As a consequence, the discourse referent set up by this NP is predicted to be available for anaphoric reference only in the scope of the negation (Karttunen 1976) — in particular, it cannot be linked to any anaphoric element in the subsequent sentence (b). This prediction is consistent with my informant's intuition that the neither (31) nor (33) is a possible story — from which I conclude that both of these discourses are intuitively incoherent (#). In this respect, they pattern like the English discourses in (32) and (34), respectively, where the indefinite NP in the (a)-sentence is also in the scope of negation.

(31) Context: "Last year, Jaaku₁ ordered [five books]₄. Yesterday, when I saw him₁,..."

a. Suli atuakka-nit taakkunangga

yet [books-ABL these-ABL]₄

ataatsi-mik tigu-si-sima-nngi-la-q.

= 28*a,*b,c

one-INS₂ get-APASS₂-perf-neg-IND-3S₁

b. Nassiun-niqar-aluar-lu-ni suli apuuti-nngi-la-q.

send-PASS-actually-GER-3SPROX₂ yet arrive-neg-IND-3S₂

Lit. "PRO₂ having actually been sent, it₂ hasn't arrived yet."

(32) Last year, Jaaku₁ ordered [five books]₄. Out of [these books]₄, yesterday when I saw him₁, he₁ had not even received one₂. #It₂ has been sent but hasn't arrived yet.

- (33) Context: "Last year, Jaaku₁ ordered five books. Yesterday when I talked to [his₁ mother]₃..."
- a. Suli atuakka-nit taakkunangga
 yet [books-ABL these-ABL]₄
 ataatsi-mik tigu-si-sima-nngi-nirar-p-a-a. = 30*a, *b, c
 one-INS₂ get-APASS₂-perf-neg-say-IND-[+tr]-3s₃.3s₁
- # b. Nassiun-niqar-aluar-lu-ni sulī apuuti-nngi-la-q.
 send-pass-actually-GER-3SPROX₂ yet arrive-neg-IND-3s₂
 Lit. "PRO₂ having actually been sent, it₂ hasn't arrived yet."
- (34) Last year, Jaaku₁ ordered [five books]₄. Yesterday when I talked to [his₁ mother]₃, she said that, out of [these books]₄, he had not even received one₂. # It₂ has been sent but hasn't arrived yet.

By contrast, the discourse in (35) was judged coherent (Q: Uqaluttualiaaqqatut atursinnaava? "Can this be used as a little story?" A: Aap "Yes"). The crucial difference is that in (35a) (cf. 29b), the antipassive suffix is outside the scope of negation, and hence, so is the instrumental NP licensed by this suffix. It follows that the discourse referent set up by this NP should still be available for anaphoric reference in the next sentence (35b) — just like the discourse referent set up by its English counterpart in (36), outside the scope of negation, is still accessible to the anaphoric pronoun in the subsequent discourse.

- (35) Context: "Last year, Jaaku₁ ordered five books. Yesterday when I talked to [his₁ mother]₃..."
- a. Suli atuakka-nit taakkunangga
 yet [books-ABL these-ABL]₄
 ataatsi-mik tassumunnga tigu-sima-nngi-nira-i-v-u-q. = 30a, b, *c
 one-INS₂ him-DAT₁ get-perf-neg-say-APASS₂-IND-[-tr]-3s₃
- b. Nassiun-niqar-aluar-lu-ni sulī apuuti-nngi-la-q.
 send-pass-actually-GER-3SPROX₂ yet arrive-neg-IND-3s₂
 Lit. "PRO₂ having actually been sent, it₂ hasn't arrived yet."
- (36) Last year, Jaaku₁ ordered [five books]₄. Yesterday when I talked to [his₁ mother]₃, she₃ said that, out of [these books]₄, there was still one₂ he₁ hadn't received. It₂ has been sent but hasn't arrived yet.

Syntactically, both split quantifier constructions in Greenlandic Eskimo consist of an obligatory verbal suffix and an optional syntactic constituent licensed by that suffix. Thus, parallel to the (AQ_i) ...-tar_i construction for expressing A-quantification, the split D-

quantifier construction takes the general form (NP-INS) ... -APASS_i . In absence of the instrumental NP component, the default quantificational force of a split antipassive D-quantifier is existential, while the scope is constrained by the antipassive suffix in the usual manner (37)-(39).

(37)

- a. Anna paar-si-v-u-q.
Anna-ABS look.after-APASS-IND-[-tr]-3s
- b. $(\exists x)$ [Anna look after x]

(38)

- a. (Ullumi) Anna paar-si-nngi-la-q
(Today) Anna-ABS look.after-APASS-neg-IND-3s
- b. $\neg (\exists x)$ [Anna look after x]

(39)

- a. Atua-nngi-ffi-qar-aannga-mi
study-neg-location-have-when.iter-3SPROX₁
Anna paar-si-sar-p-u-q
Anna-ABS₁ look.after-APASS-TAR-IND-[-tr]-3s₁
- b. Generally, if t is a time such that Anna has time off from school at t,
then $(\exists x)$ [Anna take care of x at t]

Presumably, the default existential force of an antipassive D-quantifier is responsible for its characteristic "partitive" interpretation. For instance, when the antipassive suffix is con-strued with a bare mass or bare plural NP, which may be in the same sentence or in the pre-ceding discourse, the partitive interpretation leads to the paradigm illustrated in (40)-(43). In each example, the sequence consisting of the (a) and the (b)-sentence forms a coherent discourse. The (a) sentence is the same throughout. It contains an incorporated mass noun which is anaphorically linked to one or more antipassive suffixes or transitive object agreement in the (b) sentence. The (b) sentence consists of two clauses: in (40), both are anti-passive; in (41), the first one is antipassive, while the second one is transitive; in (42), the first one is transitive, the second one, antipassive; and in (43), both are transitive. The scenarios which were tested are given in (44).

(40)

- a. Anna timusia-liur-sima-v-u-q.
Anna₁ bread₂-make-perf-IND-[-tr]-3s₁
- b. Jaaku namminiq tigu-si-llu-ni niri-Ø-v-u-q. = 44a, b, c, d
Jaaku₃ by.himself₃ take-APASS₂-GER-3SPROX₃ eat-APASS₂-IND-[-tr]-3s₃

(41)

- a. Anna timusia-liur-sima-v-u-q.
Anna₁ bread₂-make-perf-IND-[-tr]-3s₁
- b. Jaaku namminiq tigu-si-llu-ni niri-v-a-a. = 44a, b, c, *d
Jaaku₃ by.himself₃ take-APASS₂-GER-3SPROX₃ eat-IND-[-tr]-3s₃.3s₂

(42)

- a. Anna timusia-liur-sima-v-u-q.
Anna₁ bread₂-make-perf-IND-[-tr]-3s₁
- b. Jaaku namminiq tigu-llu-gu niri-Ø-v-u-q. = 44a, *b, c, d
Jaaku₃ by.himself₃ take-GER-3SOBV₂ eat-APASS₂-IND-[-tr]-3s₃

(43)

- a. Anna timusia-liur-sima-v-u-q.
Anna₁ bread₂-make-perf-IND-[-tr]-3s₁
- b. Jaaku namminiq tigu-llu-gu niri-v-a-a. = 44a, *b, c, *d
Jaaku₃ by.himself₃ take-GER-3SOBV₂ eat-IND-[+tr]-3s₃.3s₂

(44)

- a. Jaaku took all the bread that Anna baked.
- b. Jaaku took only some of the bread that Anna baked.
- c. Jaaku ate all the bread that he took.
- d. Jaaku ate only some of the bread that he took.

The informants' judgements about the scenarios in (44) suggest that the discourses in (40)-(43) are roughly equivalent to (45)-(48), respectively. As expected, the implicit object argument of each antipassive verb is existentially quantified, by default. The domain of quantification for this existential quantifier is determined by the preceding discourse. Replacing an antipassive verb with the corresponding transitive verb has the semantic effect of replacing the default existential quantifier contributed by the former with another variable binding operator, viz. σ (Link 1983), whose semantic contribution is roughly like that of the definite article in English or of the donkey pronoun *it* in Anna baked [some

bread₂. Jaaku took it₂ and ate it₂ (cf. 43)). Presumably, this pronoun-like contribution comes from the object agreement on the transitive verb — a in (41) and (43), and gu in (42)-(43) — or from an empty pro element construed with that agreement.

(45) ≈ (40)

- a. $(\exists x)[\text{bread}(x) \wedge \text{made}(a, x)]$
- b. $(\exists x: \text{bread}(x) \wedge \text{made}(a, x))[\text{take}(j, x)]$
 $\wedge (\exists x: \text{bread}(x) \wedge \text{made}(a, x) \wedge \text{take}(j, x))[\text{eat}(j, x)]$

(46) ≈ (41)

- a. $(\exists x)[\text{bread}(x) \wedge \text{made}(a, x)]$
- b. $(\exists x: \text{bread}(x) \wedge \text{made}(a, x))[\text{take}(j, x)]$
 $\wedge \text{eat}(j, \sigma x[\text{bread}(x) \wedge \text{made}(a, x) \wedge \text{take}(j, x)])$

(47) ≈ (42)

- a. $(\exists x)[\text{bread}(x) \wedge \text{made}(a, x)]$
- b. $\text{take}(j, \sigma x[\text{bread}(x) \wedge \text{made}(a, x)])$
 $\wedge (\exists x: \text{bread}(x) \wedge \text{made}(a, x) \wedge \text{take}(j, x))[\text{eat}(j, x)]$

(48) ≈ (43)

- a. $(\exists x)[\text{bread}(x) \wedge \text{make}(a, x)]$
- b. $\text{take}(j, \sigma x[\text{bread}(x) \wedge \text{made}(a, x)])$
 $\wedge \text{eat}(j, \sigma x[\text{bread}(x) \wedge \text{made}(a, x) \wedge \text{take}(j, x)])$

When the antipassive suffix is construed with a bare singular count noun or an individual denoting NP, the existentially quantified default interpretation of the construction leads to somewhat different "partitive" readings, exemplified in (49b) and (50b). The corresponding ergative sentences are included in (a), for contrast.

(49)

- a. Pavia-p atuagaq aa-v-a-a.
Pavia-ERG₁ book-ABS₂ fetch-IND-[+tr]-3s₁.3s₂
'Pavia fetched a/the book.'
- b. Pavia atuakka-mik aa-llir-p-u-q.
Pavia-ABS₁ book-INS₂ fetch-APASS₂-IND-[-tr]-3s₁
Assert: 'Pavia fetched a book.'
Imply: 'He fetched one book out of several or a book in addition to something else.'

(50)

- a. Juunap Regina miiraqatig(i-v)-a-a
 Juuna-ERG₁ Regina-ABS₂ have.a.child.with-IND-[+tr]-3s₁.3s₂
 'Juuna has a child with Regina.'
- b. Juuna Regina-mik miiraqatigi-nnip-p-u-q.
 Juuna-ABS₁ Regina-INS₂ have.a.child.with-APASS₂-IND-[-tr]-3s₁
 Assert: 'Juuna has a child with Regina.'
 Imply: 'Juuna has a child also with somebody other than Regina.'

"Partitivity" of this sort can also be attributed to the existentially quantified interpretation of the antipassive construction, if we assume that in Eskimo, as in English, quantifiers imply —by virtue of carrying a presupposition or conversational implicature —that the domain of quantification contains more than one element. That this is so is shown by the semantic anomaly (#), in both languages, of sentences like (51b) and its English translation, where the plurality requirement cannot be met. The acceptable (a) sentence is included for contrast.

(51)

- a. Jaakup atuartita-a ataasir=luunniit atuar-sinnaa-nngi-la-q.
 [Jacob's₁ student-3s₁-ABS one-ABS]₂=even read-can-neg-IND-3s₂
 'No student of John's can read.'
- # b. Jaakup anaana-a ataasir=luunniit atuar-sinnaa-nngi-la-q.
 [Jacob's₁ mother-3s₁-ABS one-ABS]₂=even read-can-neg-INS-3s₂
 ('#No mother of John's can read.')

Contrasts like (51) provide motivation for building the plurality requirement into the semantics of the logical language used to represent the meaning of natural language expressions. In particular, if u is a variable and ϕ and ψ are formulas, then the quantified formula $(\exists u: \phi)\psi$ in such a language would presuppose or implicate that the domain of quantification for the existential quantifier \exists —i.e. the set of objects in the range of u which satisfy ϕ —contains more than one element. The 'partitive' interpretation of the antipassive (b) sentences in (49) and (50) could then be represented as in (52) and (53), respectively, where the 'partitivity' is attributed to the default existential force of the quantifier contributed by the antipassive construction and the general requirement of any quantificational construction that the domain of quantification contain more than one element.

(51) ≈ (49)

a. $(\exists x: \text{book}(x))\text{fetch}(p, x)$

b. $(\exists x: \text{fetch}(p, x))\text{book}(x)$

(52) $(\exists x: \text{have.a.child.with}(j, x))[x = r]$ ≈ (50)

3. COMPOSITIONALITY.

By this point, it will be a truism that Greenlandic Eskimo poses some formidable challenges for compositional semantic theory. For instance, if we want to maintain the principle of compositionality for natural language semantics — i.e. the hypothesis, that the semantic contribution of each constituent is computed by the semantic rules as a function of the semantic contributions of its daughter(s) — then we need compositional semantic rules which assign the same truth conditions, viz. (56) (= 23b), to (53) (= 2) in English as well as (54) (= 20) and (55) (= 21) in Eskimo. This, in spite of the radical differences, on the surface, with respect to the morpheme order and the placement of word boundaries.

(53) $[_{CP}$ When a boy gets a balloon], he almost always breaks it within ten minutes.

(54) Nukappiaraq balloni-si-gaannga-mi

boy-ABS₁ balloon₂-get-when.iter-3SPROX₁

minuttit qulit naatinnagit qaartuur-tuaanna-ngajap-p-a-a.

minutes ten within break-always-almost-IND-[+tr]-3s₁.3s₂

'When a boy gets a balloon, he almost always breaks it within ten minutes.'

(55) Nukappiaraq balloni-si-gaannga-mi

boy-ABS₁ balloon₂-get-when.iter-3SPROX₁

minuttit qulit naatinnagit tama-ngaja-tigut qaartuur-tar-p-a-a.

minutes ten within all-almost-AQ₃ break-TAR₃-IND-[+tr]-3s₁.3s₂

(56) For almost all triples $\langle x, y, t \rangle$, if x is a boy, y is a balloon, and x got y at t ,

then x broke y within 10 minutes of t .

≡ (53), (54), (55)

Compositional semantic rules must also ensure the correct scope options for stranded modals in constructions like (57) (= 8); and for split A- and D-quantifiers, including a systematic account of the scope contrasts between the (a) and the (b) sentences in (58) (= 10), (60) (= 29), etc.

(57) Qularnanngitsumik Jaaku-p Aani immaqa qasu-nirar-p-a-a.
undoubtedly Jaaku-ERG₁ Aani-ABS₂ maybe tired-say-IND-[+tr]-3s₁.3s₂

(58)

a. siurna Jaaku unammi-gaannga-t
last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
Anna-p ajugaa-nirar-tuaannar-p-a-a = 59a, *b
Anna-ERG₁ win-say-always-IND-[+tr]-3s₁.3s₂

b. siurna Jaaku unammi-gaannga-t
last.year Jaaku-ABS₂ compete-when.iter-3SOBV₂
Anna-p ajugaa-juaannar-nirar-p-a-a = 59a, b
Anna-ERG₁ win-always-say-IND-[+tr]-3s₁.3s₂

(59) Scenarios:

- a. Last year, whenever Jaaku participated in a competition, Anna always said:
"He has won." '
- b. Last year, Anna said (once): "Whenever Jaaku participates in a competition,
he always wins."

(60) Context: "Last year, Jaaku₁ ordered five books. Yesterday when I talked to
[his₁ mother]₃..."

a. ...suli atuakka-mik ataatsi-mik
...yet [book-INS one-INS]₂
tigu-si-sima-nngi-nirar-p-a-a. = 61*a, *b, c
get-APASS₂-perf-neg-say-IND-[+tr]-3s₃.3s₁

b. ...suli atuakka-mik ataatsi-mik
...yet [book-INS one-INS]₂
tassumunnga tigu-sima-nngi-nira-i-v-u-q. = 61a, b, *c
him-DAT₁ get-perf-neg-say-APASS₂-IND-[-tr]-3s₃

(61) Scenarios:

- a. Jaaku's mother said: "He has already received four books. He's still waiting for
Tulluartoq by Ole Brandt".
- b. Jaaku's mother said: "He has already received four books. He's still waiting for
one book; I don't know which one."
- c. Jaaku's mother said: "No book has arrived yet. He's still waiting for all of them."

In general, the challenge posed by Greenlandic Eskimo for compositional semantic analysis — an approach which has been found to be remarkably successful in computing the

truth conditions for the familiar sentence structures of English —is that, in this heavily polysynthetic language, the familiar truth conditions are associated with sentences whose surface structure is very exotic. So far, the attempts to grapple with the problem of extending the compositional semantic analysis to Eskimo (Bittner 1988, 1994a) have barely touched the tip of the iceberg, whose size and shape I have attempted to sketch in this study. But I believe this problem to be of considerable interest for the semantic theory, because the principle of compositionality is so far the only candidate we have for a general solution to the basic empirical problem which the theory must explain: viz., how the speakers of a language can determine the truth conditions for infinitely many sentences — as evidenced by their ability to judge, for any well-formed sentence, whether it is true or false in a given scenario —in spite of the finite storage and computational capacity of the human brain. If the semantic interpretation proceeds in a compositional manner, then the knowledge of a finite interpretive system —consisting of the semantic representations of lexical items and of the compositional semantic rules —is sufficient to compute the truth conditions for any sentence that can be generated by the syntactic component of the grammar. Indeed, for a wide range of constructions in English as well as Eskimo, the set of compositional rules which are required appears to be small and universal (Bittner 1994b), suggesting that the acquisition of semantic knowledge could be essentially limited to lexical semantics. If, on the other hand, the principle of compositionality were abandoned, then the source of the semantic intuitions of native speakers would remain mysterious. I believe, therefore, that the principle of compositionality is of major importance for the semantic theory. But if so, then so are the facts of natural languages like Eskimo which, at first glance at least, challenge the hypothesis that the truth conditions of natural language sentences can be derived in a systematic fashion by applying compositional semantic rules to independently motivated syntactic structures.

ACKNOWLEDGEMENTS

I would like to thank my Eskimo consultants (Aqqaluk Abelsen, Arine Kristiansen, Anne Sofie Nielsen, Kassaaluk Qaavigaq, Ole Schmidt, Daniel Skifte, and the late Karen Recinella) for the data reported in this study. For the stimulus to do much of the empirical research, opportunities to present the intermediate results, or helpful comments, my thanks go to Emmon Bach, Ken Hale, Angelika Kratzer, Barbara Partee, the participants in the Workshop on Cross-linguistic Quantification held in conjunction with the LSA Summer Institute in Tucson, Arizona, 1989, and the audience at the talks I presented on quantification in Eskimo at the LSA Summer Insitute in Tucson and the Cognitive Science Group, University of Pennsylvania, Philadelphia. The responsibility for any errors of fact or interpretation remains, of course, my own. This work was supported in part by a grant

from the National Science Foundation, BNS-9108381, which I hereby gratefully acknowledge.

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