

Movement of quantificational heads

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1 Introduction

Head Movement (HM) usually lacks semantic effects, particularly scope effects (Chomsky 2001, i.a.). Matushansky (2006) attributes the scarcity of HM with semantic/scope effects to semantic types of heads.

- In most cases, it is $\langle e, t \rangle / \langle e, \langle e, t \rangle \rangle$ for predicates and $\langle e \rangle$ for nouns.
- Their interpretation is the same in either the launching or the landing position.

Such explanation makes a concrete prediction on quantificational heads:

- (1) Movement of quantificational heads may impose scope effects.

A number of works discussing modals and aspectual verbs appear to verify (1) (Lechner 2007; Szabolcsi 2011; Iatridou and Zeijlstra 2013), but have nonetheless been challenged recently (Hall 2015; McCloskey 2016).

The goals for today:

- (2) a. to present a novel piece of evidence from Cantonese that (1) is borne out;
 b. to show that HM is subject to an LF interface condition (i.e. Scope Economy), in the same way as quantificational phrases (e.g. generalized quantifiers).

Take-home messages:

- (3) a. HM with scope effects is expected to be rare, as it is restricted to quantificational heads and is further constrained by Scope Economy;
 b. The claim that head and phrasal movement are constrained by the same interface condition resonates with recent efforts in unifying head and phrasal movement (Hartman 2011; Funakoshi 2014; Harizanov 2019; Pesetsky 2020).

2 Cantonese aspectual verbs

Aspectual verbs like *hoici* 'begin' canonically appear after the subject.

- (4) a. Aaming hoici haau-dou hou singzik
 Aaming begin get-able good result
 'Aaming begins to get good results.'
 b. *hoici Aaming haau-dou hou singzik
 begin Aaming get-able good result

If the subject is quantificational, *hoici* 'begin' can appear in the initial position.

- (5) a. dak Aaming hoici haau-dou hou singzik (only > begin / *begin > only)
 only Aaming begin get-able good result
 'Only Aaming is such that he begins to get good results.'
 b. hoici dak Aaming haau-dou hou singzik (*only > begin / begin > only)
 begin only Aaming get-able good result
 'It begins to be the case that only Aaming is getting good results.'

Sentences in (5a) and (5b) are truth-conditionally distinct.

(5a) only Aaming > begin		(5b) begin > only Aaming	
Who is getting good results...			
Test 1	Test 2	Test 1	Test 2
Aaming: 40	Aaming: 100	Aaming: 100	Aaming: 100
Bill: 40	Bill: 40	Bill: 40	Bill: 40
Chris: 100	Chris: 100	Chris: 100	Chris: 40

The same pattern is also observed with another aspectual verb *gaizuk* 'continue' and modals, e.g. *hoji* 'may', but not with control verbs, e.g. *soengsi* 'try'; see §4.2.

3 A head movement account

First, I propose that (5b) is derived from (5a), where *hoici* 'begin' moves to a position c-commanding the subject and takes scope over 'only'.

(6) Deriving (5b) from (5a) under a HM approach

begin [TP only Aaming_i ___ [_{vP} t_i get-good-result]] *scope enrichment*

Secondly, and importantly, I propose that the movement fails to apply if it violates Scope Economy. (Fox 2000).

(7) Scope Economy (Fox 2000)

[Scope-shifting operations] that are not forced by type consideration must have a semantic effect.

Since the subject is non-quantificaitonal in (4b), movement of *hoici* 'begin' fails to shift scope relations.

(8) Attempted derivation of (4b) from (4a) under a HM approach

begin [TP Aaming_i ___ [_{vP} t_i get-good-result]] *vacuous movement*

Further evidence for Scope Economy

Minimal pairs with (non-)quantificational **subjects**:

(9) Existential quantifiers vs. pronouns (a. begin > most)

hoici [_{SUBJ} a. ^{OK}daiboufan-jan/ b. *keoidei] ___ haau-dou hou singzik
 begin most-person they get-able good result
 'It begins to be the case that most people/ they are getting good results.'

Minimal pairs with (non-)quantificational **topics**:

(10) Universal quantifiers vs. definite NPs (a. begin > every)

hoici [_{TOP} a. ^{OK}cyunbou-jan/ b. *ni-go-jan] Aaming (dou) ___ hou
 begin every-person this-CL-person Aaming all very
 jansoeng
 praise
 'It begins to be the case that Aaming praises. everyone/ this person.'

Minimal pairs with (non-)quantificational **adverbs**:

(11) 'At every school' vs. 'at our school' (a. begin > every)

hoici [_{ADV} a. ^{OK}hai mui-gaan-hokhaau/ b. *hai ngodei-hokhaau] Aaming
 begin at every-CL-school at our-school Aaming
 (dou) ___ haau-dou hou singzik
 all get-able good result

'It begins to be the case that, at every/ our school(s), Aaming is getting good results.'

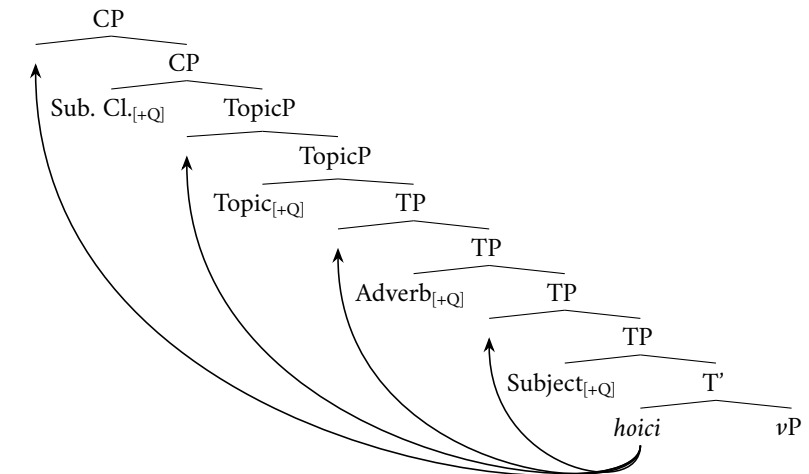
Minimal pairs with (non-)quantificational **subordinate clauses**:

(12) 'Whenever'-clause vs. 'because'-clause (a. begin > whenever)

hoici [_{CP} a. ^{OK}faanhai daa-fung/ b. *janwai daa-fung]
 begin whenever approach-typhoon because approach-typhoon
 hoimin (dou) ___ wui jau daailong
 sea all will have big.waves

'It begins to be the case that whenever/ because typhoons approach, there will be big waves on the sea.'

The data suggest that movement of *hoici* 'begin' is regulated by Scope Economy: it is only licensed by a c-commanding quantificational element, schematically represented below. Importantly, its movement obtains scope significance.



4 Compositional issues

4.1 Aspectual verbs as generalized quantifiers

Following Szabolcsi (2011), I suggest that, in Cantonese,

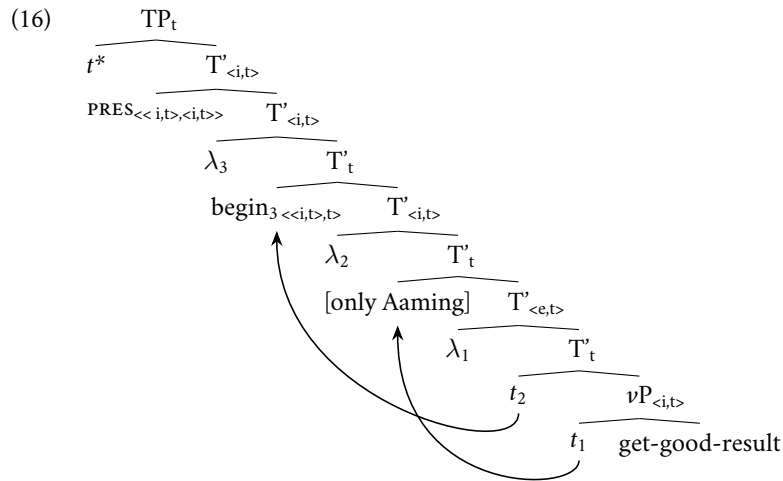
- (14) a. Aspectual verbs are generalized quantifiers over times (of type $\langle i,t \rangle, t \rangle$).
- b. They head a functional projection above νP (cf. Fukuda 2008, 2012).

The (oversimplified) lexical semantics of *hoici* ‘begin’:

- (15) $\llbracket hoici_I \rrbracket = \lambda P_{\langle i,t \rangle, t}. \exists t' \exists t'' [t' < t_1 \leq t'' \wedge \neg P(t') \wedge P(t'')]$
 (Read as: There exist two time intervals t' and t'' such that $t' < t_1 \leq t''$ and P is false at time t' and P is true at time t'')¹

A demonstration with the sentence in (5b) is given below. I assume the framework of tense by Kusumoto (2005), see Appendix A).²

Importantly, the movement of ‘begin’ leaves a trace of a lower type (i.e. t_2 is a time variable, bound by ‘begin’), in the same way as phrasal quantifiers.



- (17) $\llbracket (16) \rrbracket = \exists t'' [t'' = t^* \wedge \exists t' \exists t''' [t' < t'' \leq t''' \wedge [\neg \text{only Aaming } \lambda x. \text{get-good-result}(x)(t') \wedge \text{only Aaming } \lambda x. \text{get-good-result}(x)(t''')]]]$

1. The semantics of *hoici* contains a time variable, which could have been further decomposed, where *hoici* is of type $\langle i, \langle \langle i,t \rangle, t \rangle \rangle$ and it takes a covert time variable prior to the event core (see Beck and Stechow 2015).
 2. I assume obligatory subject movement for Case (cf. Li 1990).

4.2 Semantic types matter

The analysis extends to all aspectual verbs as they are of the same type. For example, *gaizuk* ‘continue’,

- (18) a. (dak) Hoenggong gaizuk paai tau sapwai
 only Hong.Kong continue rank initial tenth
 ‘(Only) HK is such that she continues to rank among the first tenth.’
- b. gaizuk *(dak) Hoenggong __ paai tau sapwai
 continue only Hong.Kong rank initial tenth
 Int.: ‘It continues to be the case that (only) HK ranks among the first tenth.’

We also capture the observation that modal verbs that are generalized quantifiers over worlds (of type $\langle s,t \rangle, t \rangle$) pattern with aspectual verbs (cf. Matushansky 2006).

- (19) a. (dak) Aaming hoji zou fan
 only Aaming may early sleep
 ‘(Only) Aaming may sleep early.’
- b. hoji *(dak) Aaming __ zou fan
 may only Aaming early sleep
 Int.: ‘It is allowed that (only) Aaming sleeps early.’

However, verbs that are not of the type of generalized quantifiers cannot undergo the movement, such as control verbs and dynamic modals.

Since they take two arguments (type: $\langle \langle s,t \rangle, \langle e,t \rangle \rangle$) and their trace will be of the same type, HM would violate Scope Economy. This is true no matter whether there is a higher c-commanding quantificational element.

- (20) a. *soengsi (dak) Aaming __ tiujin Maalaaicong control verbs
 try only Aaming challenge Marathon
 Int.: ‘(Only) Aaming tried to take Marathon (as a challenge).’
- b. *sik (dak) Aaming __ gong jingman dynamic modals
 can only Aaming speak English
 Int.: ‘(Only) Aaming can speak English.’

5 Residue issues

5.1 Alternative analyses

Alternatives come in two families:

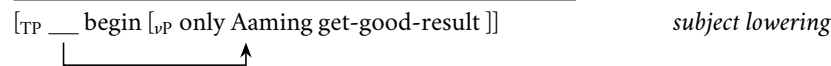
- Heads do not move: **(a)** Subject lowering; **(b)** Remnant VP movement
- Nothing moves at all: **(c)** Multiple base generation positions of aspectual verbs

Instead of verb movement, **(a)** amounts to a suggestion that

- the subject is reconstructed at LF and its lower copy is pronounced at PF, a case where both LF and PF ‘privilege’ the lower copy (Bobaljik 2002), or
- the subject undergoes Quantifier Lowering.

A demonstration of the idea:

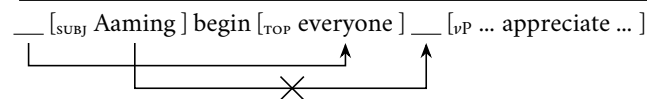
(21) Deriving (5b) from (5a) in a subject lowering approach



- **(4b)** is ruled out because the subject (i.e. a proper name) is not quantificational, assuming, for the sake of discussion, reconstruction also obeys Scope Economy.

However, this approach does not extend to elements other than subjects. Consider an attempted derivation for (10a), i.e. surface order ‘begin > everyone > Aaming ...’:

(22) (Halfway) derivation of (10a) under a subject lowering approach



- Importantly, if subject lowering were allowed in (22), **(4b)** would have been allowed as well.

Other approaches:

- **(b)** presumes a productive scrambling mechanism in Cantonese, whose existence is questionable (Soh 1998; Cheng and Vicente 2013).
- **(c)** requires establishment of an unconventional link between the availability of base generation positions and Scope Economy.

5.2 Cross-linguistic variation

Variation on scope effects. Not all movement of quantificational heads affect scope.

(23) German V2 movement (p.c. Stefan Keine)

- a. [_{CP} Nur die Aktienkurse [_{C'} begannen_i im Mai t_i zu steigen]]
 only the stock.prices began in May to rise
 ‘In May, it began to be the case that only stock prices rise.’
- b. [_{CP} Im Mai [_{C'} begannen_i nur die Aktienkurse t_i zu steigen]]
 in May began only the stock.prices to rise
 ‘In May, it began to be the case that only stock prices rise.’

It may support the idea that HM is available in different components (Harizanov and Gribanova 2019). Languages vary w.r.t. whether HM is syntactic or post-syntactic.

Variation on the trigger of HM. HM with discourse effects are not constrained by Scope Economy.

(24) Bulgarian participle fronting (Embick and Izvorski 1997)

- a. Šte sām pročel knjigata.
 will be.1s.prs read the.book
 ‘I’ll have read the book.’
- b. Pročel šte sām ___ knjigata.

It suggests a distinction between HM triggered by discourse features and HM triggered by scope effects. Languages vary in terms of available triggers.

Negation. Movement of negation (presumably of type <t,t>) has been shown to be able to affect scope relations and it is subject to Scope Economy.

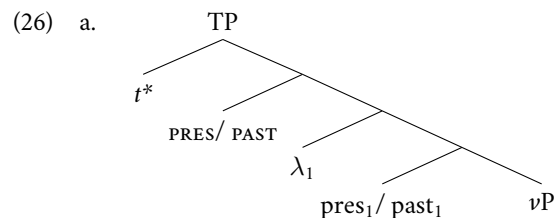
(25) Negative Auxiliary Inversion in West Texas English (Matyiku 2017, p.16, 75)

- a. Everybody didn’t go to the party.
- b. Didn’t everybody see the fight. (not > everybody; *everybody > not)
 ‘Not everybody saw the fight.’
- c. *Didn’t Jamie see the fight.

Either the movement does not leave a trace or the trace is deleted at LF (Cable 2010; Matyiku 2017). Languages vary w.r.t. the availability of such mechanism.

Appendix A: the framework on tense

The basic components of the framework on tense by Kusumoto (2005), assuming νP to be the event core of type $\langle i, t \rangle$:



- b. t^* : The speech time provided by the context
- c. PRES/ PAST: Null operator on time variables (of type $\langle \langle i, t \rangle, \langle i, t \rangle \rangle$)
 e.g. $\llbracket \text{PAST} \rrbracket = \lambda P_{\langle i, t \rangle}. \lambda t. \exists t' [t' < t \wedge P(t')]$
 e.g. $\llbracket \text{PRES} \rrbracket = \lambda P_{\langle i, t \rangle}. \lambda t. \exists t' [t' = t \wedge P(t')]$
- d. $\text{pres}_1 / \text{past}_1$: Time variables, realized as tense morphemes

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