

Two Types of Temporal Adverbial Clauses in Cantonese

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1. Introduction

One major task in syntactic theory is to understand how adjuncts are related to the clausal architecture, among which adverbial clauses have drawn considerable interests because of their articulated internal structure and different degrees of integration into main clauses. Recently, accumulating evidence reveals that the *internal* structure of adverbial clauses shows remarkable correlation with their *external* relation to main clauses (Haegeman 2003, 2010, Endo & Haegeman 2019), a generalization that holds cross-linguistically in English (Haegeman 1991 *et seq.*, Verstraete 2002, 2007), Akɔɔse (Zentz 2011), Bulgarian (Laskova 2012), French (Lahousse 2010, Lahousse & Borremans 2014), German (Frey 2012, Frey & Truckenbrodt 2015), Greek (Tsimpli, Papadopoulou & Mylonaki 2010), Japanese (Endo 2012), Mandarin Chinese (Lu 2003, Wei & Li 2018), Swedish (Müller 2017), etc. This generalization, which may be dubbed as *the internal-external correlation*, is exemplified in (1):

- (1) [While_{conc} this ongoing lawsuit probably won't stop the use of lethal injection],
it will certainly delay its use [while_{temp} the Supreme Court decides what to do].
(Haegeman 2009:399)

The first *while* clause carries a concessive meaning and the second one carries a temporal meaning. They are classified as peripheral adverbial clauses (PACs) and central adverbial clauses (CACs) respectively. In terms of external syntax, the temporal *while* clause is more integrated with the main clause (and hence “central”), whereas the concessive *while* clause is “peripheral” and less integrated in taking a wider scope over the temporal *while* clause. This correlates with their internal syntax: the temporal *while* clause has a “impoverished” structure and does not allow an epistemic adverb which may occur in the concessive *while* clause.

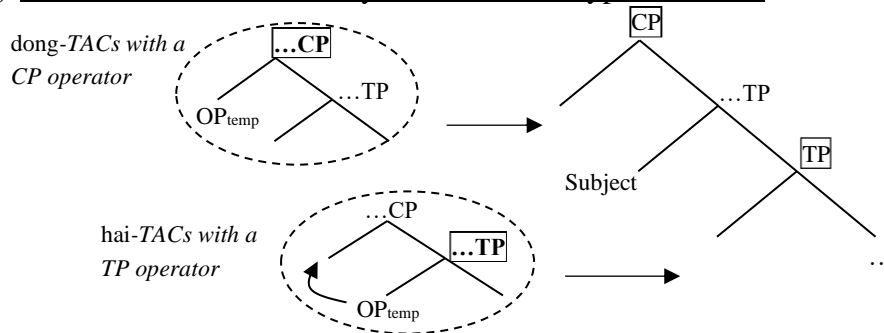
While previous studies have reached a general consensus that the split of CACs and PACs lies on their attachment sites to main clauses for the external syntax,¹ different approaches have been proposed for the internal syntax. One approach, developed in Haegeman (2003) and refined in Endo and Haegeman (2019), posits that adverbial clauses differ in their

¹ Haegeman (2009, 2010, 2012) and Verstraete (2002, 2007) further reduce the difference in attachment sites to the difference between subordination and coordination.

“richness” of internal structure, i.e. CACs lack peripheral structural layers as compared to PACs.² Another approach, as advocated in Haegeman (2009, 2010, 2012), argues that CACs also have an articulated peripheral structure, and the crucial difference with PACs is that CACs are derived by operator movement to the left periphery which blocks the presence of certain elements, but not PACs.

In this paper, I present novel evidence from temporal adverbial clauses (henceforth TACs) in Cantonese to motivate an approach that builds on the height of operators. While I adopt Haegeman (2010) in assuming that CACs also have a periphery, I show that TACs, often regarded as CACs, are not uniformly derived by operator movement, but they also involve *in-situ* operators. Concretely, a temporal operator may either (i) merge within TP, followed by movement to the specifier of CP; or (ii) directly merge at the highest CP without any movement. The merging site of the operator determines whether movement is needed. The first movement strategy forms TACs headed by a preposition *hai* ‘at’ in Cantonese, and the second in-situ strategy derives another type of TACs headed by a subordinator *dong* ‘at, when, while’. Crucially, the merging site also determines the external syntax, following the insight of “matching condition” in Endo and Haegeman (2019). Specifically, a TAC derived by an operator merged within TP attaches lower to a TP (i.e. *hai*-TACs), and a TAC with a CP operator attaches higher to a CP (i.e. *dong*-TACs), showing a structural “matching” effect between the operator height and the attachment site to main clauses. The differences of the two types of TACs are schematized below:

(2) The internal and external syntax of the two types of TACs



In this way, both the internal syntax and external syntax can be accounted for by the height of operators. Consequently, this proposal lends support to the conception that the external syntax of adverbial clauses is reducible to their internal syntax.

² Note that Endo and Haegeman (2019) go beyond the CAC-PAC dichotomy and propose a fine-grained gradient typology on six classes of Japanese adverbial clauses in terms of their structural “richness” and attachment sites, see Section 4.2.

This paper is organized as follows. Section 2 introduces the two types of TACs in Cantonese and how they behave differently in their internal syntax. Section 3 accounts for the internal syntax by proposing that a null temporal operator may merge at two different positions. Additional evidence supporting the existence of the null operator comes from a converbal marker *-haa* which agrees with a temporal operator. Section 4 shows how the two types of TACs differ in their external syntax, and furthermore, how these differences are related to the height of their operator merging sites. Section 5 concludes.

Before proceeding, it should be noted that the findings in this paper may also apply to Mandarin Chinese, which largely patterns with Cantonese regarding the two types of TACs.

2. The internal syntax of the two types of TACs

In Cantonese, TACs with a simultaneous reading of the embedded event and the matrix event may be expressed by a preposition *hai* ‘at’ or a subordinator *dong* ‘at, when, while’. To form a TAC, *hai* must occur with a head time noun phrase *gozan(si)* ‘that time’ (= (3)) or *sihau* ‘time’, whereas the head NP is optional for *dong* (= (4)).^{3,4}

- (3) [**Hai** Aafan haangceot munhau *(gozan)], Aaming zau dou-zo
 HAI Fan walk.out door that.time Ming then arrive-PERF
 ‘Ming arrived at the time when Fan walked outside the door.’
- (4) [**Dong** Aafan haangceot munhau (gozan)], Aaming zau dou-zo
 DONG Fan walk.out door that.time Ming then arrive-PERF
 ‘Ming arrived (at the time) when Fan walked outside the door.’

Moreover, *hai* may also take a simple time NP like *camjat* ‘yesterday’. In contrast, *dong* cannot take an NP and must be followed by a clause, as shown in (5).⁵

³ All the Cantonese examples are transcribed in *Jyutping*, also known as the Linguistic Society of Hong Kong Cantonese Romanization Scheme. Tones are represented as follows: 1 = high level, 2 = high rising, 3 = mid-level, 4 = low falling, 5 = low rising, 6 = low level, which will be marked when necessary. Abbreviations: 1, 2, 3 = first, second, third person respectively; ADD = affixal additive quantifier; ALL = affixal universal quantifier; CL = classifier; IMP = imperative marker; MOD = modifier marker; NEG = negation; PASS = passive voice marker; PERF = perfective aspect marker; PL = plural; PROG = progressive aspect marker; SFP = sentence-final particle; SG = singular.

⁴ Note that while *dong* is a designated marker for TACs, *hai* may also serve as a locative preposition.

⁵ Mandarin *zai* ‘at’ and *dang* ‘at, when, while’ also exhibit the same, see Pan and Paul (2018). Note that they treat *dang* as a preposition requiring a head NP (modified by a clause). Yet, a number of real-life examples in Cantonese do not have a head NP (e.g. (i)), which seems to suggest that *dong* is a conjunction at C. This may also explain why *dong* never takes a simple NP. Nevertheless, the categorical status of *dong/dang* does not directly bear on differentiating between the two types of TACs and I remain open to this issue.

(i) [Dong camjat zingsik saudou zoeng BRP],
 while ytd. officially received CL BRP
 satsatzoizoi ge gamgok zikhak ceot-saai lai.
 firm MOD feeling immediately out-ALL come
 ‘When I received the BRP officially, I felt real in that moment.’ (Blog, accessed on 6/4/2021)

Unlike *hai*-TACs, *dong*-TACs do not have the high-low ambiguities. (9) only has the odd high reading.⁶ This is reminiscent of English (temporal) *while*, which also lacks a low reading as in (10) (Larson 1990).

- (9) #[Dong [Maangaajan **jyujin** [saigaai wui waimit]] gozan],
 DONG Maya.people foretell world will destroy that.time
 ngo zung saangngaungau.
 1SG still alive

High: #‘I’m still alive at the time when Maya people made the apocalyptic prophecy.’

*Low: ‘I’m still alive at the time when Maya people predicted to be the end of the world.’

- (10) I didn’t see Mary in New York [while [she **said** [she was there]]]

High: ‘I didn’t see Mary in New York at the time of her utterance.’

*Low: ‘I didn’t see Mary in New York at the time that she claimed to be when she was there.’ (Larson 1990:174)

2.2. Quantificational elements

Another difference of *hai*-TACs and *dong*-TACs lies on whether they allow quantificational elements (henceforth Qu-elements) such as focus and modals. First, only *dong*-TACs, but not *hai*-TACs, may allow an exhaustive (subject) focus marked by *hai6* ‘be’ (in low level tone, to be distinguished with the high rising tone of the preposition *hai2* ‘at’), as in (11).

- (11) [{a. *hai2 / b. dong} **hai6** Aaming fangaau gozan], lousi zau faatnau.
 HAI DONG be Ming sleep that.time teacher then mad
 ‘The teacher became mad when it was MING (but not someone else) that fell asleep.’

Similarly, epistemic modals such as *jinggoi* ‘should, probably’ may occur naturally in *dong*-TACs but are degraded in *hai*-TACs.

- (12) [{a. ??hai/ b. dong} Aaming **jinggoi**^{Epi} zung hai ukkei gozan],
 HAI DONG Ming should still at home that.time
 jau gingcaat soeng keoi ukkei
 have police go 3SG home

‘The police came to Ming’s house when he probably was still at home.’

⁶ The same applies to Mandarin *dang*-TACs, which to the best of my knowledge has not been documented yet.

Note that (11) and (12) carry an episodic temporal reading. *Hai*-TACs and *dong*-TACs may also express a conditional-like reading, and when they do so, only *dong* can be followed by a conditional marker *jyugwo* ‘if’, but not *hai*.⁷ The same contrast is also found in other (un)conditional markers, e.g. *ziji* ‘if and only if’ and *mouleon* ‘no matter what’. Conditional markers in Chinese may license a *wh*-indefinite with an existential reading (Lin 2014; universal reading for unconditional markers) and carry quantificational force.

- (13)[{a. **hai* / b. *dong*} **jyugwo** ngo heoi zeoizuk ni di je ge sihou],
 HAI DONG if 1SG go chase this CL.PL thing MOD time
 zi wui ling ngo ganggaa tungfu
 only will let 1SG more pain
 ‘When I seek those things, it will only cause me more pain.’
 (adapted from the [social media](#), accessed on 6/4/2021)

Yet, not all Qu-elements are banned in *hai*-TACs. Specifically, Qu-elements that have a lower position at the clausal spine are allowed in *hai*-TACs, such as deontic *jinggoi* ‘should, ought’. Following Tsai’s (2015) cartographic approach to modals, deontic modals in Chinese are lower than TP and epistemic modals are higher than TP (*cf.* epistemic *jinggoi* in (12)).

- (14)Camjat [{a. *hai* / b. *dong*} keoi **jinggoi**^{Deo} zouje gozan],
 yesterday HAI DONG 3SG should work that.time
 keoi jan zau mgin-zo
 3SG body then disappear-PERF
 ‘Yesterday at the time when he should work, he was just gone.’

Lin ‘even’-focus may also occur in *hai*-TACs, as the (preposed) object focus in (15). As claimed by Cheung (2015), *lin*-focus occupies a position lower than the exhaustive *hai*-focus in Cantonese.

- (15)[{a. *hai* / b. *dong*} Aaming **lin** **souhok** dou caau-mai gozan],
 HAI DONG Ming even math also fail-ADD that.time
 lousi zau faatnau.
 teacher then mad
 ‘The teacher became mad when Ming even failed mathematics.’

⁷ For an example of conditional-like *hai*-TACs, see (ii).

(ii) [{*hai* / *jyugwo*} ceso jau jan gozan], m-hou japheoi.
 HAI if toilet have person that.time NEG.IMP enter.go
 ‘Don’t go inside when/if there is someone in the toilet.’

Interestingly, if the object focus further moves to a pre-subject position, *dong* is preferred over *hai*:

- (16) [{a. ??hai / b. dong} **lin go ziliu gong me** (nei) dou m-ming ge sihou], ...
 HAI DONG even CL data say what 2SG also NEG-know MOD time
 ‘When (you) don’t even know what the data is about, ...’
 (adapted from a [website](#), accessed on 6/4/2021)

Hence, it can be concluded that Qu-elements that are lower than the canonical position of subjects (i.e. Spec,TP) are allowed in *hai*-TACs, but not those higher than Spec,TP, which are otherwise allowed in *dong*-TACs.

Moreover, Qu-elements also interact with the high-low ambiguities in *hai*-TACs. When there is a low Qu-element in the upper clause of *hai*-TACs, only low readings are available, such as (17):⁸

- (17) #**Hai** [Maangaajan **hoji**^{Deo} jyu jin [saigaai wui waimit]] gozan],
 HAI Maya.people can foretell world will destroy that.time
 ngo zung saangngaungau.
 1SG still alive
 High: #‘I’m still alive at the time when Maya people could make the apocalyptic prophecy.’
 *Low: ‘I’m still alive at the time when Maya people could predict to be the end of the world.’

To summarize this section, the differences in internal syntax of *hai*- and *dong*- TACs are listed below:

(18) The asymmetries in internal syntax for the two types of TACs in Cantonese

	<i>hai</i> - TACs	<i>dong</i> - TACs
i. High-low ambiguities	YES	NO
ii. Low reading blocked by islands	YES	N/A
iii. Ban on high Qu-elements (e.g. modal ^{Epi})	YES	NO
iv. Low reading blocked by low Qu-elements (e.g. modal ^{Deo})	YES	N/A


⁸ I thank Zhuo Chen for drawing my attention to this point.

3. Accounting for the internal syntax

3.1. Two merging sites of temporal operators

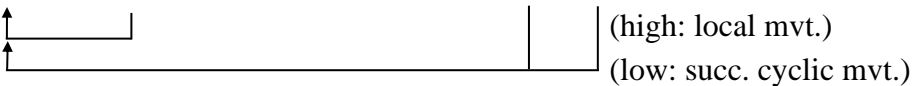
To account for the asymmetries in internal syntax between *hai*-TACs and *dong*-TACs, I propose that they are derived differently in terms of the merging site of temporal operators. Specifically, a null temporal operator is base-generated within TP in *hai*-TACs and then undergoes movement to the edge of CP (Spec,CP). This null operator is comparable to the temporal relative pronoun *when* in English, i.e. it forms a temporal relative clause. Since Chinese has no overt relative pronouns (e.g. in nominal relative relatives), the temporal operator is also null. In *dong*-TACs, rather than merging within TP, the operator is base-generated in a higher position, namely the edge of (the highest) CP. Since it directly merges to Spec,CP, no further movement is required, as outlined below.

(19) Different operator merging sites in the two types of TACs

- a. *hai* [CP **OP_{temp}** ... [TP ... *t* ...]]
 (operator movement)
- b. *dong* [CP **OP_{temp}** ... [TP ...]] (in-situ operator)⁹

First, the difference in the high-low ambiguities can be explained straightforwardly. In *hai*-TACs, the operator may merge within the TP of the higher clause or the lower clause. In the former case, the operator relativizes the event time of the upper clause, and moves locally to Spec,CP to derive the high reading. In the latter case, the operator relativizes the event time of the lower clause, and undergoes successive cyclic movement to the upper Spec,CP, yielding the low reading. The movement may be blocked by islands, as in the complex NP island we have seen in Section 2.1. In *dong*-TACs, however, the operator directly merges to the highest CP, i.e. the CP of the upper clause. It does not merge in the lower clause and no operator movement occurs, and hence the lack of the low reading.¹⁰

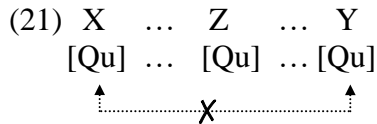
(20) High-low ambiguities derived by operator movement

- a. *hai* [CP **OP_{temp}** [TP **t_{high}** Maya people predicted [CP [TP **t_{low}** the world will end ...]]]
 (high: local mvt.)
 (low: succ. cyclic mvt.)
- b. *dong* [CP **OP_{temp}** [TP Maya people predicted [CP [TP the world will end ...]]]
 (high: no mvt.)

⁹ *Dong* may also be base-generated at C, associated with the in-situ temporal operator in its specifier. See footnote 5 for the categorical status of *dong*.

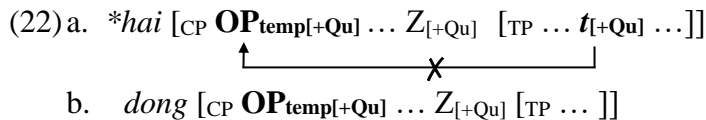
¹⁰ The in-situ operator may relativize the whole TP (the upper and lower clause) rather than relativizing a time variable within TP by creating a gap, in the sense of Lipták's (2005) *IP-relativization*.

Second, the distribution of quantificational elements can also be accounted for. Adopting Rizzi's (2001, 2004) feature-based Relativized Minimality, an element may induce minimality effects to a dependency formed by its kin. For instance, an element carrying the superfeature [Qu] (e.g. negation) may disrupt the dependency formed by another Qu-element (e.g. *wh*-operators), as in (21).

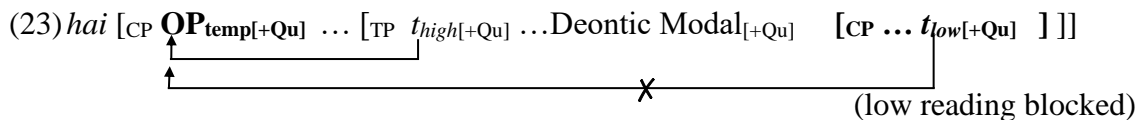


The set of Qu-elements is language-specific, e.g. (argumental) topics in English may block *wh*-movement but not in Italian (Rizzi 2004). In Chinese, typical Qu-elements include modals, focus and negation, which induce minimality effects in *why*-questions and A-not-A questions (Wu 1997, Law 2001, Soh 2005, Tsai & Yang 2015, *i.a.*).

Against this theoretical backdrop, the ban on high Qu-elements (e.g. exhaustive focus) in *hai*-TACs can then be derived by Relativized Minimality with the assumption that the temporal operator is a *wh*-relative operator carrying a [Qu] feature. Any Qu-elements higher than TP will be on the movement path of the operator and disrupt the movement, as shown below. In contrast, the operator in *dong*-TACs merges directly to the highest CP without movement and thus no minimality effects would be triggered.¹¹



While Qu-elements below TP (e.g. deontic modals) are too low to disrupt the operator movement in *hai*-TACs, they may trigger minimality effects to an operator that originates in the lower clause and moves across the Qu-elements. In effect, an operator must merge in the higher clause to avoid disruption, resulting in a high reading. This explains why low Qu-elements may block a low reading.



¹¹ I leave whether minimality effects can be reduced to semantics (e.g. Beck 2006) to further research.

3.2. A converbal marker agreeing with temporal operators

Since the temporal operator is null, one may wonder whether it really exists in syntax, in particular in *dong*-TACs since the in-situ operator cannot be diagnosed by tests for movement dependencies. Below, I provide evidence from a converbal marker *-haa* which establishes an agreement dependency with the temporal operator.

-Haa2 (in high rising tone) is a progressive aspectual suffix that attaches to a reduplicated verb. It must occur in an adverbial clause, a defining property of converbs (Haspelmath 1995).¹² It can only occur in TACs (including *hai* and *dong*), but not root clauses, argumental subordinate clauses, nor any other adverbial clauses. That is, adding a subordinator of condition (*jyugwo* ‘if’), reason (*janwai* ‘because’), or concession (*seojjin* ‘although’) would yield ungrammaticality.¹³

- (24) [(Hai/dong) Aafan fanfan-**haa** gaau (gozan)], *(Aaming lai wan keoi)
 HAI DONG Fan RED.sleep-CONV nap that.time Ming come find 3SG
 ‘Ming came find Fan while she was sleeping.’

I argue that the close link between *-haa* and TACs can be captured if *-haa* agrees with a temporal (relative) operator. Thus, it always occurs in a TAC formed by a temporal operator:

- (25) [CP=TAC **OP**_{temp} ... [AspP *-haa*_[temp] ... [vP ...
 ↑ ↑ (agreement)

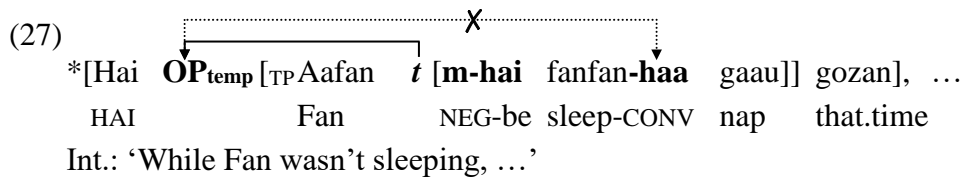
The first argument comes from locality. *-Haa* cannot be embedded in a lower clause (= (26)), i.e. it cannot be too “far away” from the temporal operator (which ends up at the highest CP, regardless of whether movement occurs). The clause-boundedness obeys the Phase Impenetrability Condition (PIC, Chomsky 2000, 2001), which dictates that the elements in the lower phasal complement are not accessible to the higher phase (see also Yip 2019 for the *phase*-bounded nature of the agreement).

- (26) (agreement blocked)
 *[(Hai/ dong **OP**_{temp} go go jan gong [CP zigei ge zai fanfan-**haa**] gozan], ...
 HAI DONG that CL person say self MOD son sleep-CONV that.time
 Int.: ‘When that person told me that his/her son was sleeping, ...’

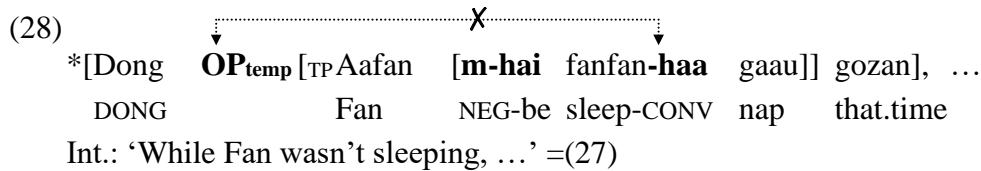
¹² The converbal *haa2* should be distinguished from another suffix *haa5* (in low rising tone), which is not a converbal suffix. See Yip (2019) for their syntactic and interpretive differences.

¹³ For an overview of converbs in Cantonese, see Tang (2018, 2021) and Yip (2019, 2021).

The second argument is the “extra” minimality effects when *-haa* occurs in *hai*-TACs. Recall that the temporal operator merges within TP in *hai*-TACs, which is subject to the minimality effects induced by Qu-elements above TP only. Notably, with the presence of *-haa*, low Qu-elements below TP (and above AspP) may also induce minimality effects, e.g. the negation in (27). The sentence would have been grammatical if *-haa* is replaced by another progressive suffix *-gan*. The “extra” minimality effects induced by the negation indicates that there is a syntactic dependency between the higher temporal operator and the lower *-haa*, which should be understood as agreement.

- (27) 
- *[Hai **OP_{temp}** [TP Aafan *t* [**m-hai** fanfan-**haa** gaau]] gozan], ...
 HAI Fan NEG-be sleep-CONV nap that.time
 Int.: ‘While Fan wasn’t sleeping, ...’

Surprisingly, minimality effects are also found in *dong*-TACs when *-haa* is present, as shown in (28). The unexpected minimality effects can be explained if (i) there is a (null) temporal operator in *dong*-TACs; and (ii) *-haa* agrees with the null operator, which also receives support from (26)-(27). Hence, the agreement between *-haa* and temporal operators provides evidence for the existence of (null) in-situ operators in *dong*-TACs.

- (28) 
- *[Dong **OP_{temp}** [TP Aafan [**m-hai** fanfan-**haa** gaau]] gozan], ...
 DONG Fan NEG-be sleep-CONV nap that.time
 Int.: ‘While Fan wasn’t sleeping, ...’ = (27)

4. Internal syntax corelates with external syntax

In this section, I first examine the external syntax of *hai*-TACs and *dong*-TACs, and then address how it may be related to their internal syntax.

4.1. The external syntax of the two types of TACs

Unlike English, certain types of adverbial clauses in Chinese may be integrated into the main clause following the matrix subject (Pan & Paul 2018). Interestingly, when we consider TACs, only *hai*-TACs allow such integration, but not *dong*-TACs, as shown in (29). This suggests that while *hai*-TACs may attach lower to main clauses below the subject (i.e. Spec,TP), *dong*-TACs must attach to a higher layer beyond TP.

- (29) **Aaming** [{a. hai/ b. *dong} Aafan fan-gan gaau gozan] lai wan keoi
 Ming HAI DONG Fan sleep-PROG nap that.time come find 3SG
 ‘Ming came find Fan while she was sleeping.’

Another contrast is found in local N(egative)P(olarity)I(tem)-licensing. Cantonese sentence-final particle *zyu* ‘yet’ is an NPI that needs to be licensed by a clausemate negation (Tang 2009):

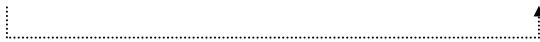
- (30) a. Ngo zaansing [keoi *(m-)gong go daapon **zyu**]
 1SG agree 3SG NEG-say CL answer yet
 ‘I agree that he shouldn’t tell the answer yet.’
 b. *Ngo m-zaansing [keoi gong go daapon **zyu**]
 1SG NEG-agree 3SG say CL answer yet (Tang 2009:235)

A negation preceding *hai*-TACs may license *zyu*, but not for *dong*-TACs (= (31) a vs. b). This shows that the *hai*-TAC in (a), along with the negation, belongs to the local domain where *zyu* is licensed, i.e. it attaches lower to the main clause. The *dong*-TAC in (b), however, must occur outside that local domain, i.e. its attachment site is too high to be considered local, presumably at CP.

- (31) **M-hou** [{a. hai/ b. *dong} aamaa lai gozan] coeng go **zyu**!
 NEG.IMP HAI DONG mum come that.time sing song yet
 ‘Don’t sing yet when Mum comes!’

An additional piece of evidence comes from reconstruction. In terms of surface order, both *hai*-TACs and *dong*-TACs may precede the matrix subjects of main clauses. When they contain a reflexive, only *hai*-TACs, but not *dong*-TACs, allow the reflexive to be bound by the matrix subjects. That is, *hai*-TACs may reconstruct under the matrix subject, indicating that they originate at that position, and the surface pre-subject position is derived by movement. *Dong*-TACs, in contrast, attach to a position higher than the matrix subject and reconstruction is not possible.¹⁴

- (32) [{a. hai / b. ??dong} **keoizigei_k** bun syu bei jan waakfaa gozan],
 HAI DONG SG.self CL book PASS person smear that.time
Aaming_k faat-zo jat coeng peihei.
 Ming lose-PERF one CL temper
 ‘Ming_k lost his temper when his_k book got smeared by someone.’

- (33) [CP [TAC **hai** himself_k’s book got smeared], [TP Ming_k _ lost his temper]]

 (reconstruction for reflexive binding)

¹⁴ While the reconstruction reading in *hai*-TACs is available to all the speakers I consulted, some found it to be possible in *dong*-TACs as well. Nevertheless, they still found *hai* to be more acceptable than *dong*.

In short, *hai*-TACs have a lower attachment site to main clauses below subjects in TP, whereas *dong*-TACs have a higher attachment site above subjects at CP, as summarized below.¹⁵

(34) The attachment sites of the two types of TACs to main clauses

- a. [CP ... [TP Subj. [**hai**-TAC] ...]]
- b. [CP [**dong**-TAC] ... [TP Subj. ...]]

4.2. *Determining attachment sites by operator sites*

Taking stock, as for internal syntax, a temporal operator merges within TP in *hai*-TACs, and merges at (the highest) CP in *dong*-TACs; as for external syntax, *hai*-TACs attach to TP below matrix subjects, and *dong*-TACs attach to CP. Here, an internal-external correlation figures in a systematic way, i.e. the height of the operator merging site correlates with the attachment site of TACs to main clauses:

- (35) a. TP operator → TACs attach to TP
- b. CP operator → TACs attach to CP

In other words, the *label* of the phrase immediately dominating the operator matches with the phrase immediately dominating the TACs (i.e. TP for *hai*-TACs, CP for *dong*-TACs).

A similar correlation is also found in Japanese (Endo 2012, Endo & Haegeman 2019), which is even more sophisticated. Formed by head movement, Japanese adverbial clauses have six classes among which five functional heads are identified (Asp, Neg/Pol, T, S-Mood, A-Mood). Notably, each class is derived by moving a designated functional head internally (with the exception of *toki* ‘when’), and attaches to a phrase with the corresponding head. For example, an adverbial clause derived by Asp head movement will attach to AspP of the main clause.

To capture this correlation, Endo and Haegeman (2019) propose a featural matching condition on the clause typing feature of adverbial clauses and the feature of a functional head in main clauses, mediated by Mod(ification) head. The clause typing feature of adverbial clauses is determined by the moving head (say, [Asp]), and due to the matching

¹⁵ One may wonder whether the two TACs can co-occur. The answer is yes, and when they co-occur, it is preferred to put the *dong*-TACs before *hai*-TACs, as shown in (iii).

(iii) Soengnin [{a. **dong**/ b. **?hai** } hokhaau syunbou sukgaam jansau (gozan)],
 last.year DONG HAI school announce reduce labour that.time
 [{a. **hai**/ b. **?dong** } go lousi soengtong (gozan)], keoi haam-zo ceotlai
 HAI DONG CL teacher teach that.time 3SG cry-PERF out
 ‘Last year, when the school announced the layoff, while the teacher was teaching, s/he cried.’

condition, it must attach to a phrase carrying the corresponding feature, which is AspP. In this way, the external syntax is determined by the internal syntax: the moving head in an adverbial clause decides its attachment site to the main clause.

Despite the same matching effect, Cantonese differs from Japanese in forming adverbial clauses by merging an operator (to a specifier) but not head movement. One possibility here is to recast Endo and Haegeman's idea under the labeling theory (Chomsky 2013, 2015). In the labeling theory, when two phrases merge $\{XP, YP\}$, there are two ways to determine the label: (i) either one moves out and the remaining one is the label; (ii) the two phrases agree and the shared feature is the label, e.g. $\langle z, z \rangle$. The second option may be adopted to implement Endo and Haegeman's idea in Cantonese. Assume that the temporal operator in TACs agrees with the phrase that it merges with, and the shared feature determines the resulting label. For example, OP_{temp} agrees with CP in *dong*-TACs with the resulting label as $\langle tempC, tempC \rangle$. Then, the $TAC_{\langle tempC, tempC \rangle}$ attaches to the main clause, and agrees with the phrase that it attaches to for successful labeling. Consequently, the attachment site has to be a CP which carries the corresponding feature, deriving the internal-external correlation.¹⁶

5. Conclusion

Providing novel evidence from Cantonese, this paper argues that TACs may be formed in two ways, depending on the merging site of temporal operators. A temporal operator may merge at TP and further moves to CP, as in *hai*-TACs. Alternatively, the temporal operator may also merge higher at CP without any movement, as in *dong*-TACs. Crucially, the operator merging sites correlate with the attachment sites: *hai*-TACs with a TP operator attach to a TP, and *dong*-TACs with a CP operator attach to a CP. This internal-external correlation may be captured by recasting Endo and Haegeman's (2019) feature matching proposal under the labeling theory for Cantonese, where the operator merging sites determine the attachment sites by labeling through a shared feature. In conclusion, the two types of TACs in Cantonese not only call for a finer typology of TACs (Lipták 2005), but also lend support to the conception that the external syntax of adverbial clauses is reducible to their internal syntax.

¹⁶ Note that this suggestion departs from the current labeling theory where adjuncts do *not* involve in the labeling of the clausal spine, i.e. when an adjunct (pair-)merges with an XP, the label is always XP. I leave this issue to future research.

6. References

- Beck, Sigrid. 2006. Intervention effects follow from focus interpretation. *Natural Language Semantics* 14(1): 1-56.
- Borremans, Marijke, and Karen Lahousse. 2014. The distribution of functional-pragmatic types of clefts in adverbial clauses. *Linguistics* 52(3): 793–836.
- Cheung, Candice Chi-Hang. 2015. On the fine structure of the left periphery: The positions of topic and focus in Cantonese. In Wei-Tien Dylan Tsai, ed., *The Cartography of Chinese Syntax*, 76–130. Oxford: Oxford University Press.
- Chomsky, Noam. 2000. Minimalist inquiries: the framework. In Roger Andrew Martin, David Michaels, and Juan Uriagereka, eds., *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, 89–155. Cambridge: MIT Press.
- Chomsky, Noam. 2001. Derivation by phase. In M. Kenstovicz, ed., *Ken Hale: A Life in Language*, 1–54. Cambridge: MIT Press.
- Chomsky, Noam. 2013. Problems of projection. *Lingua* 130: 33–49.
- Chomsky, Noam. 2015. Problems of projection: extensions. In Elisa Di Domenico, Cornelia Hamann, and Simona Matteini, eds., *Structures, Strategies and Beyond: Studies in Honour of Adriana Belletti*, 1–16. Amsterdam: John Benjamins.
- Endo, Yoshio, and Liliane Haegeman. 2019. Adverbial clauses and adverbial concord. *Glossa* 4(1): 48.1–32.
- Endo, Yoshio. 2012. The syntax discourse interface in adverbial clauses. In Lobke Aelbrecht, Liliane Haegeman, and Rachel Nye, eds., *Main Clause Phenomena: New Horizons*, 365–384. Amsterdam: John Benjamins Publishing.
- Frey, Werner and Hubert Truckenbrodt. 2015. Syntactic and prosodic integration and disintegration in peripheral adverbial clauses and in right dislocation/afterthought. In Andreas Trotzke, and Josef Bayer, eds., *Syntactic Complexity across Interfaces*, 75–106. Berlin: Mouton de Gruyter.
- Frey, Werner. 2012. On two types of adverbial clauses allowing root-phenomena. In Lobke Aelbrecht, Liliane Haegeman, and Rachel Nye, eds., *Main Clause Phenomena: New Horizons*, 405–429. Amsterdam: John Benjamins Publishing.
- Geis, Michael. 1970. Adverbial subordinate clauses in English. PhD dissertation, Massachusetts Institute of Technology.
- Haegeman, Liliane. 1991. Parenthetical adverbials: The radical orphanage approach. In Shuji Chiba et al., eds., *Aspects of Modern English Linguistics: Papers Presented to Masatomo Ukaji on his 60th Birthday*, 232–254. Tokyo: Kaitakusya.
- Haegeman, Liliane. 2003. Conditional clauses: external and internal syntax. *Mind and Language* 18: 317–339.
- Haegeman, Liliane. 2009. The movement analysis of temporal adverbial clauses. *English Language and Linguistics* 13(3): 385–408.
- Haegeman, Liliane. 2010. The internal syntax of adverbial clauses. *Lingua* 120: 628–648.

- Haegeman, Liliane. 2012. *Adverbial Clauses, Main Clause Phenomena, and Composition of the Left Periphery. The Cartography of Syntactic Structures*, Vol. 8. Oxford: Oxford University Press.
- Haspelmath, Martin. 1995. The converb as a cross-linguistically valid category. In Martin Haspelmath, and Ekkehard König, eds., *Converbs in Cross-Linguistic Perspective*, 1–55. Berlin: Mouton de Gruyter.
- Lahousse, Karen. 2010. Information structure and epistemic modality in adverbial clauses in French. *Studies in Language* 34: 298–326.
- Larson, Richard, 1987. ‘Missing prepositions’ and the analysis of English free relative clauses. *Linguistic Inquiry* 18: 239–266.
- Larson, Richard, 1990. Extraction and multiple selection in PP. *The Linguistic Review* 7: 169–182.
- Laskova, Vesselina. 2012. Subjunctive mood, epistemic modality and Main Clause Phenomena in the analysis of adverbial clauses. In Lobke Aelbrecht, Liliane Haegeman, and Rachel Nye, eds., *Main Clause Phenomena: New Horizons*, 385–404. Amsterdam: John Benjamins Publishing.
- Law, Ann. 2001. A-not-A questions in Cantonese. *University College London Working Papers in Linguistics* 13: 295–318.
- Lin, Jo-wang. 2014. *Wh*-expressions in Mandarin Chinese. In C.-T. James Huang, Y.-H. Audrey Li, and Andrew Simpson, eds., *The Handbook of Chinese Linguistics*, 180–207. Chichester: Wiley-Blackwell.
- Liou, Yu-fen. 2003. On Chinese temporal clauses. PhD dissertation, Michigan State University.
- Lipták, Anikó. 2005. Relativization strategies in temporal adjunct clauses. *Linguistic Variation Yearbook* 5(1): 65–117.
- Lu, Peng. 2003. *La subordination adverbiale en chinois contemporain* (in French). PhD dissertation, University Paris 7.
- Müller, Christiane. 2017. Extraction from adjunct islands in Swedish. *Norsk Lingvistisk Tidsskrift* 35(1): 67–85.
- Pan, Victor Junnan, and Waltraud Paul. 2018. The syntax of complex sentences in Mandarin Chinese: a comprehensive overview with analyses. *Linguistic Analysis* 42(1-2):63–162.
- Rizzi, Luigi. 2001. Relativized minimality effects. In Mark Baltin, and Chris Collins, eds., *The Handbook of Contemporary Syntactic Theory*, 89–110. Wiley-Blackwell.
- Rizzi, Luigi. 2004. Locality and left periphery. In Adriana Belletti, ed., *Structures and Beyond*, 223–251. Oxford: Oxford University Press.
- Soh, Hooi Ling. 2005. *Wh*-in-situ in Mandarin Chinese. *Linguistic Inquiry* 36(1): 143–155.

- Tang, Sze-Wing. 2009. The sentence final particle *zyu* and the discontinuous constructions in Cantonese (in Chinese). *Zhongguo Yuwen* [Studies of the Chinese Language] 3: 234–240.
- Tang, Sze-Wing. 2018. Verbal suffixes and completeness in Cantonese (in Chinese). In Dah-An Ho et al., eds., *Frontiers in the Study of Sinitic and Sino-Tibetan Languages: Festschrift in Honor of Professor Ting Pang-hsin on His 80th Birthday*, 686–696. Beijing: Social Sciences Academic Press (China).
- Tang, Sze-Wing. 2021. On the syntax of incompleteness: evidence from the converbal construction in Cantonese. Ms., The Chinese University of Hong Kong.
- Tsai, Wei-tien Dylan, and Ching-yu Helen Yang. 2015. Inner vs. outer A-not-A questions. Paper presented on International Workshop on Cartography of Syntax, Beijing Language and Culture University.
- Tsai, Wei-Tien Dylan. 2015. On the topography of Chinese modals. In Ur Shlonsky, ed., *Beyond Functional Sequence*, 275–294. Oxford: Oxford University Press.
- Tsimpli, Ianthi-Maria, Despina Papadopoulou, and Agapi Mylonaki. 2010. Temporal modification in Greek adverbial clauses: the role of aspect and negation. *Lingua* 120(3): 649–672.
- Ürögdi, Barbara. 2009. Temporal adverbial clauses with or without operator movement. In Katalin É. Kiss, ed., *Adverbs and Adverbial Adjuncts at the Interfaces*, 133–168. Berlin: Mouton de Gruyter.
- Verstraete, Jean-Christophe. 2002. Interpersonal grammar and clause combining in English. PhD dissertation, University of Leuven.
- Verstraete, Jean-Christophe. 2007. *Rethinking the Coordinate-Subordinate Dichotomy: Interpersonal Grammar and the Analysis of Adverbial Clauses in English*. Berlin: Mouton de Gruyter.
- Wei, Wei Haley, and Yen-Hui Audrey Li. 2018. Adverbial clauses in Mandarin Chinese, part 1-3. *Linguistic Analysis* 42(1-2): 163–330.
- Wu, Jianxin. 1997. A model-theoretic approach to A-not-A questions. *University of Pennsylvania Working Papers in Linguistics* 4(2): 273–289.
- Yip, Ka-Fai. 2019. The incompleteness effects of Cantonese verbal suffixes (in Chinese). MPhil thesis, The Chinese University of Hong Kong.
- Yip, Ka-Fai. 2021. Converbs and adverbial clauses: a case study in Cantonese. Paper presented at The 33rd meeting of the North American Conference on Chinese Linguistics (NACCL-33), University of Chicago.
- Zentz, Jason. 2011. Morphological evidence for a movement analysis of adverbial clauses. In *Proceedings from the 47th Annual Meeting of the Chicago Linguistic Society (CLS)*, 373–385. Chicago: Chicago Linguistic Society.