

COMPENSATORY LENGTHENING OF “*ho*⁷(\bar{h})” IN TAIWANESE SOUTHERN MIN*

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Abstract: This paper explores the compensatory lengthening of *ho*⁷ where *ho*⁷ is a giving verb occurring in modern Taiwanese Southern Min (henceforth TSM), a major Sinitic language prevalent in Southern China and Taiwan. Previous studies investigated the nature of giving verbs from a variety of perspectives and considerable concerns have arisen over the semantic and syntactic behavior of ditransitive construction as well as the Mandarin Chinese grammatical category of *gei* 給 ‘give’, which all yield fruitful results. (Cheng et al. 1999) However, one of the most intriguing constructions involving *ho*⁷, namely the “V1 *ho*⁷ (pro) V2” construction, particularly the 3rd person pronoun omitted in the indirect object position, is still under-explored.

*ho*⁷ in construction “V1 *ho*⁷ (pro) V2” will lengthen when pronoun is omitted. As opposed to ordinary cases, it realizes the compensatory lengthening by glottal stop as a rest in melody. The purpose of the paper is to investigate the phenomenon in question from two aspects. They are motivation of occurrence of glottal stop (Lehiste 1979, Kreiman 1982) and boundary marker implemented in phonology-syntax interface (Trubetzkoy 1939). The discussion will start from syntactic approach (Chomsky 1981, 1995, 2005, Cheng et al. 1999, Hung 1999, Lasnik 2000, 2001, 2002, Merchant 2001.) to phonological one (Selkirk 1984, 1986, Nespor and Vogel 1986, Prince and Smolensky 1993/2004, Truckenbrodt 1999, 2005, López 2009). Based on attested evidence, I propose that the compensatory lengthening of *ho*⁷ is a boundary marker plus silent time slot implemented in phonology-syntax interface.

Keywords: *ho*⁷, glottal stop, boundary marker, silent time slot, repair by ellipsis, WRAP, phonology-syntax interface

1. Introduction

* Part of this paper was presented 2010, The 60th Annual Conference of The Chinese Linguistic Society of Japan, Yokohama, Japan. I think the audience therefor the comments and suggestions. Special thank for Li Shen and Pei-yi Hsiao. I am grateful for accepting the academic research grants of NSC-ANR DIAMIN(台法研究計畫)「閩南語歷時演變」(NSC 98-2923-H-007-001-MY3) during the writing. Special thanks go to Kuang-yu Chang, Chin-fa Lien, Tzong-Hong Jonah Lin, Chia-yin Hu, Pei-yi Hsiao, Chao-kai Shi, and Chian-Tang Su for the discussions and help in all occasions. I am also grateful for the critical and crucial comments from Hui-Chuan Huang, and Shiang-yi Chiang and my commentators Chao-kai Shi, and Ting Huang. Of course, all errors are mine alone.

USTWPL 6: 1-22, 2010.
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1.1 Background

In Taiwanese and other varieties of Southern Min, it is well known that a single morpheme *ho⁷* occurs in a number of constructions whose counterparts in Mandarin (or other dialect or language) may involve several different morphemes. Descriptively, six syntactic patterns may be distinguished that all involve *ho⁷*: (Cheng et al. 1999):

(1)

	Examples	Pattern	Type
A.	我 <i>ho⁷</i> 汝三百塊。	<i>ho⁷</i> NP1NP2	DOC ¹ -1
B.	我送 <i>ho⁷</i> 伊一本書。 我丟 <i>ho⁷</i> 伊四根骨頭。	V- <i>ho⁷</i> NP1NP2	DOC-2
C.	我賞一先錢 <i>ho⁷</i> 汝。 我還三百塊 <i>ho⁷</i> 伊。	VNP2 <i>ho⁷</i> NP1	Dative
D.	我唱一首歌 <i>ho⁷</i> 伊聽。 我跳 <i>ho⁷</i> 汝看。	V(NP2) <i>ho⁷</i> NP1V	SVC ²
E.	彼個查某人伊 <i>ho⁷</i> 騙去矣。 伊 <i>ho⁷</i> 我擱一個耳光。	<i>ho⁷</i> NPVP	Passive
F.	我 <i>ho⁷</i> 伊得第一名。 咱來跳 <i>ho⁷</i> 伊爽, 跳 <i>ho⁷</i> 伊勇。 我唱一首歌 <i>ho⁷</i> 伊較好睏。	<i>ho⁷</i> NPVP	Causative

1.2 Research Questions

On this paper, we focus on Pattern D. Pattern D has sometimes been lumped together with other superficially similar sentence under the term “Serial Verb Construction” (SVC, Li and Thompson 1981).

Furthermore, we will spot light on omitted pronouns of Pattern D. There are two constraints of the omitted pronouns. Constraint 1: omitted pronouns are limited to the 3rd person in the IO³ position. Constraint 2: omitted pronouns are restricted to extended construction. But we won't discuss the constraints here.

Interestingly, *ho⁷* in construction “V1 *ho⁷* (pro) V2” will lengthen when pronoun is omitted. As opposed to ordinary cases, it realizes the compensatory lengthening by glottal stop as a rest in melody.

The purpose of the paper is to investigate the phenomenon in question from two aspects, motivation of occurrence of glottal stop (Lehiste 1979, Kreiman 1982), and boundary marker plus silent time slot implemented in phonology-syntax interface.

¹ DOC = double-object construction.

² SVC = serial verb construction (SVC, e.g. Li and Thompson 1981).

³ IO = indirect object.

1.3 Organization of this Paper

This paper is organized as follows. Section 2 describes the motivation of the occurrence of glottal stop. I will discuss motivation of occurrence of glottal stop. In section 3, I review at the syntactic analysis of *ho*⁷ by Cheng et al. — namely, null operator movement and follow their syntactic analysis. Section 4 I propose an analysis, where it is argued that syntactic properties of relevant clauses that have to do with the assignment of intonational phrases paly an important role in determining its distribution. In section 5, An OT analysis of the current analysis discussed. Section 6 is the conclusion.

2. Motivation of Occurrence of Glottal Stop

According to Lehiste (1979), the two important characteristics of intonational boundary are low fundamental frequency of vowel quality and glottalization. Trubetzkoy (1939) noted that glottal stop is used as boundary marker in many languages. And it also occurs in many Austronesian languages. Kreiman (1982) also discovered pause, glottalization, PBL⁴ and contour tone are helpful to distinguish boundary.

There are many ways to distinguish boundaries. In MC⁵, there are three levels of perception of boundaries (Ye 1996): perception 1: Pause (It is longer than 90ms⁶.), perception 2: PBL (It occurs before pause which is longer than 90ms.), and perception 3: contour tone (In common, it is low fundamental frequency of vowel quality.).

For our purpose, perception 1, pause, is involved in our discussion. If pause is longer than 90ms, it will always occur after utterance to mark boundary. Contrary to that, the shorter pause (< 90ms) usually occurs with another boundary marker, like glottal stop or contour tone, to mark intonational phrases in utterance.

In TSM, tone value will keep citation tone in right end of phonological word out of tone sandhi circle (Chen 2000). More specifically, contour tone may no realize in TSM. That is to say that shorter pause usually occurs with glottal stop to mark intonational phrases in utterance. That motivation may result in the occurrence of glottal stop.

3. Syntactic Analysis of *ho*⁷ in SVC

3.1 The Structure of *ho*⁷ Structure in SVC (Cheng et al. 1999)

The structure proposed for these sentence is identical to (2) except for their

⁴ Pre-Boundary Lengthening

⁵ Mandarin Chinese

⁶ millisecond

terminal elements, and for the fact that the lowest verb *tiann*¹ 聽 and *khuann*³ 看 are lexically realized but do not conflate with the higher *ho*⁷. The D-Structure⁷ representations (3a-b) are as follows:

- (3) a. Gua² tshiunn³ cit⁸-siu² kua¹ [Pro ho⁷ [i¹ tiann¹ e]]⁸
 I sing one-CL⁹ song Ho he listen
 [我 唱 一首 歌 [Pro ho⁷ [伊 聽 [e]]]]
 ‘I sing one song for him to listen to.’
- b. Gua² thiau³ [Pro ho⁷ [li² khuann³ e]]
 I jump Ho you see
 [我 跳 [Pro ho⁷ [汝 看 [e]]]]
 ‘I jump for you to see.’

Each of the embedded clauses here is a canonical causative serving as a secondary predicate. This relation is established when the object [e] adjoins itself to the clause headed by *ho*⁷ and is co-indexed with a matrix constituent:

- (4) a. Gua² tshiunn³ cit⁸-siu² kua¹_i [OP_i [Pro ho⁷ [i¹ tiann¹ t_i]]]
 I sing one-CL song Ho he listen
 [我 唱 一首 歌 [OP_i [Pro ho⁷ [伊 聽 [t_i]]]]]
 ‘I sing one song for him to listen to.’
- b. Gua² thiau³ [OP_i [Pro ho⁷ [li² khuann³ t_i]]]
 I jump Ho you see
 [我 跳 [OP_i [Pro ho⁷ [汝 看 [t_i]]]]]
 ‘I jump for you to see.’

That is, the object of the secondary predicate is base-generated as a null element, which then undergoes A'-movement to the left periphery of the secondary predicate, where it is co-indexed with a matrix argument according to Cheng et al. (1999)

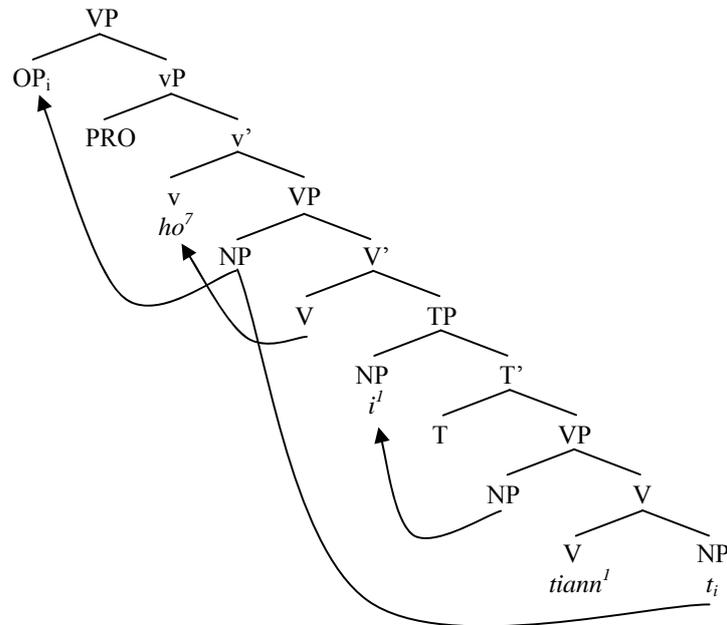
Syntactically, the null operator movement allows the null object variable to be strongly bound (Chomsky 1986a) by the matrix argument. Take (4a) for example, we can have syntactic tree as follows (We focus on embedded clause here.):

⁷ D-structure = deep structure.

⁸ The transcription of TSM words is based on the dictionary of Taiwanese Southern Min 《台灣閩南語常用詞辭典》 (on-line version) edited by Taiwan's Ministry of Education.

⁹ CL = classifier.

(5)



The above example has been analyzed as involving A'-movement of a null operator (OP) in the embedded clause and a base-generated phrase in the matrix clause. In this regard, the noun phrase in question may remain in-situ while the trace in the embedded clause is attributed to the null operator movement.

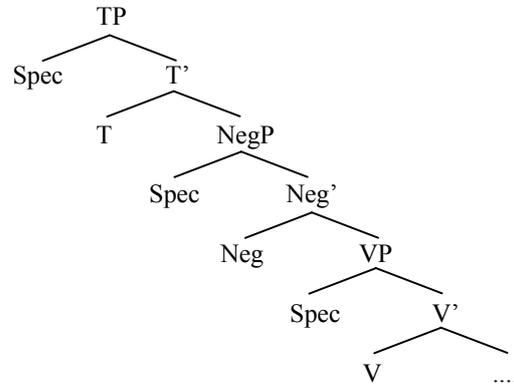
3.2 Syntactic Evidence

The spirit of this syntactic analysis is on the embedded clause, TP. Put differently, $i^l \notin$ is a direct object-like properties of the ECM (Exceptional Case Marking) subject due to the fact that it is governed and assigned case by the root verb in Government and Binding theory. Sure, in Minimalist Program it is feature-checking now (Chomsky 1995). So two tests are designed to check it is TP or not.

Negation Test

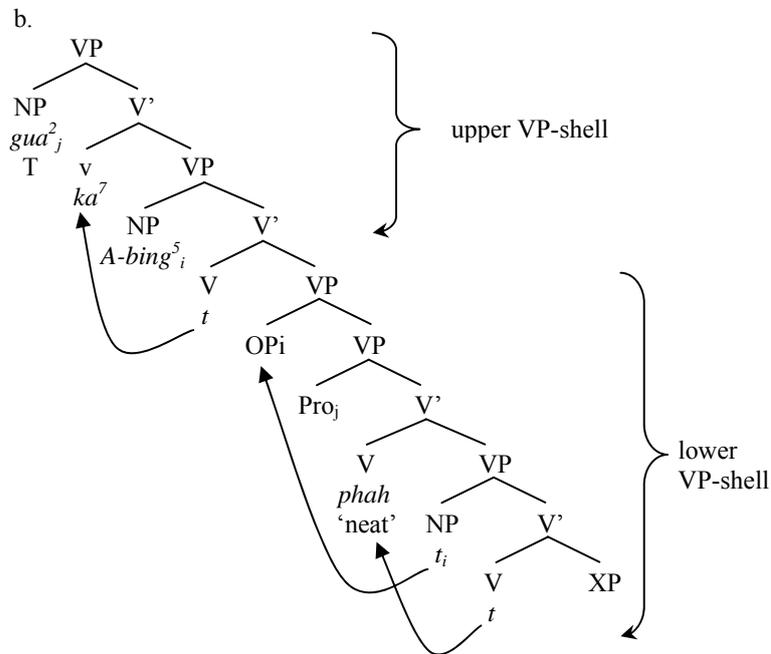
A well-known fact is that Negative is base-generated under T, along with Agr_s and Tense. Pollock (1989) argues that Negative is an independent category which projects its own X-bar structure NegP, separate from that of T. Neg superficially appears intervening between the T element (Agr_s and Tense) supported by *do*-support and the main verb, NegP is located between T and VP in the sentences structure.

(6)



We may take *ka*⁷ 𠵹-construction for example first. According to Li's (2001) proposal, *ka*⁷-construction is a complex "double vP-shell". Meanwhile, Lin (2001) adopts the Lasonian VP-shell and treats *ka*⁷ as an overt realization of the light verb AFFECT (321: (65)). Yang (2006) follows both their proposals, and he proposes the following structure (7) where the upper VP-shell is akin to Li's (2001) while VP-shell is a secondary predicate induced by the Null Operator Movement:

- (7) a. Gua² *ka*⁷ A-bing⁵_i [OP_i [Pro *phah*¹ t_i]] (Yang 2006(28))
I KA Abing beat
我 *ka*⁷ 阿明 [OP_i [Pro 打 t_i]]
'I beat Abing'



I follow this analysis. (7) is a double VP-shell. Negation is located between T and VP in the sentences structure, so it can't occur here in this construction:

- (8) a. *Gua² ka⁷ A-bing⁵_i [be⁵ [OP_i [Pro phah¹ t_i]]]
 I KA Abing NEG¹⁰ beat
 我 ka⁷ 阿明 [袂 [OP_i [Pro 打 t_i]]]
 'I don't beat Abing'

In(9), I will show the negation of (4) is OK.

- (9) a. Gua² tshiunn³ cit⁸-siu² kua¹_i [OP_i [Pro ho⁷ [i¹ be⁷ tiann¹ t_i a]]]
 I sing one-CL song Ho he NEG listen Perf.¹¹
 [我 唱 一首 歌 [OP_i [Pro ho⁷ [伊 袂 聽 [t_i 矣]]]]
 'I sing one song for him not to listen to.'

Negation is permitted in the construction. This is a evidence that the embedded clause includes TP-level at least. Syntactically, it seem most straightforward to assume that the lower scope position for negation corresponds to NegP(Pollock, 1989; Haegeman, 1995). As to higher position, the close correspondence

¹⁰ NEG= negation.

¹¹ Perf. = perfective aspect marker.

between sentential negation and focus has been noted. Lasnik (1972) claims that [Neg] appears in a Comp(=C) position. Rizzi (1997) updates this in term of his split-CP hypothesis, claiming the [Neg] is generated as a feature of T and in order to take sentential scope, must undergo movement to his Foc(us) head.

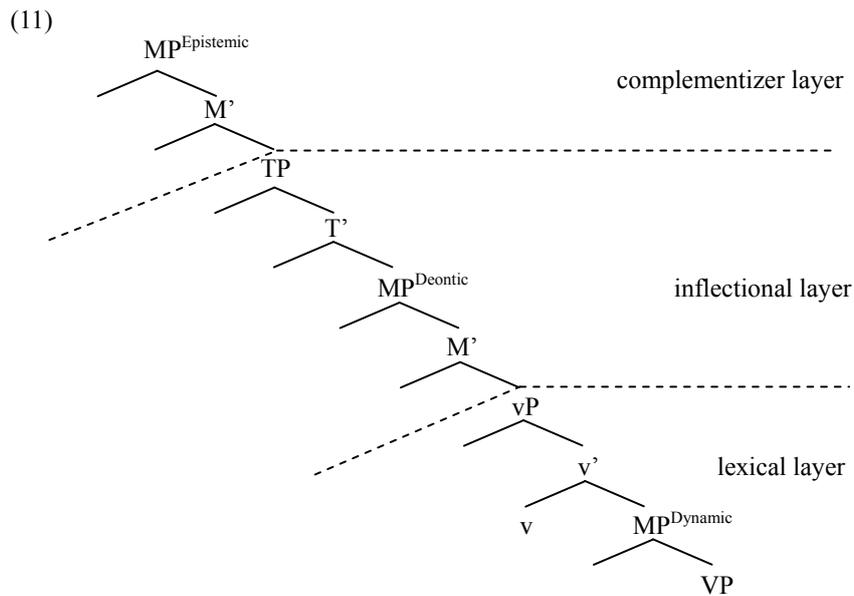
In our constructure of embedded clause, we can't get sentential negation:

(10) [我唱一首歌[OP;_i[Pro *ho*⁷ [伊袂聽[t_i矣]]]]

Scope: subject > negation

Modal test

Another strong evidence is modal. The core idea is Kratzer's (1991) classical analysis of modals. According to Butler's (2002) proposal, it gives rise to two scope positions for modals: one associated with the vP phase, and one with the CP phase. It is shown that the former scope position leads to root readings of modals and the latter to epistemic readings. On the track of Rizzi's (1997) proposal, which argues three layers of distribution of modals, a framework proposed by Tsai (2010) shows the modal layers in MC as follows:



The embedded clause in question is a TP, so it doesn't include complementizer layer. In the studies discussed above, we can not have epistemic meaning in the embedded clause. We take *e7* 會 as testing tool to test the sentence (3a):

- (12) [我唱一首歌[Pro *ho*⁷ [伊會聽[e]]]]
 ‘I sing one song for him can listen to.’
 Scope: subject > dynamic modal
 ⇒ We only have dynamic modal meaning.

On the other hand, if a clause includes CP-level. The Location of modal may yield ambiguity results in meanings. The example is shown in (13).

- (13) I¹ e⁷ khi³ hak⁸-hau⁷.
 He M^{Epi/Dyn} go school
 他 會 去 學校
 ‘He will go to school.’ or ‘He is able to go to school.’
 Scope: epistemic modal > subject > dynamic modal
 ⇒ We have both modal meanings.

If the embedded clause in question includes CP-Level, the clause involved modal *e*⁷ 會 will have ambiguity. In our observation, only dynamic modal meaning is attested. After the two tests, we can make sure our embedded clause, the second predicate, of pattern D (see (2)) is a TP. Based on the statement, and we can go on the core analysis of this article.

4. Compensatory Lengthening of *ho*⁷

4.1 Compensatory Lengthening of *ho*⁷ when Pronoun is Omitted

Now, we can go back to the *ho*⁷ in the construction “V1 *ho*⁷ (pro) V2” when pronoun is omitted.

- (14) a. Gua² tshiunn³ cit⁸-siu² kua¹_i [OP_i [Pro *ho*⁷ [i¹ tiann¹ t_i]]]
 I sing one-CL song Ho he listen
 [我 唱 一首 歌 [OP_i [Pro *ho*⁷ [伊 聽 [t_i]]]]]
 ‘I sing one song for him to listen to.’
 b. Gua² tshiunn³ cit⁸-siu² kua¹_i [OP_i [Pro *ho*[?] [ɿ¹ tiann¹ t_i]]]
 I sing one-CL song Ho ~~he~~ listen
 [我 唱 一首 歌 [OP_i [Pro *ho*[?] [伊 聽 [t_i]]]]]
 ‘I sing one song for him to listen to.’

First, we should make sure the intonational phrase(henceforth I-phrase) boundaries of (14a) and (14b). I show I-phrase boundary of (14a) as follows:

- (15) (Gua² tshiunn³ cit⁸-siu² kua¹) (ho⁷ i¹) (tiann¹).
 I sing one-CL song Ho he listen
 [我 唱 一首 歌 [OP_i [Pro *ho*⁷ [伊 聽 [t_i]]]]]
 ‘I sing one song for him to listen to.’

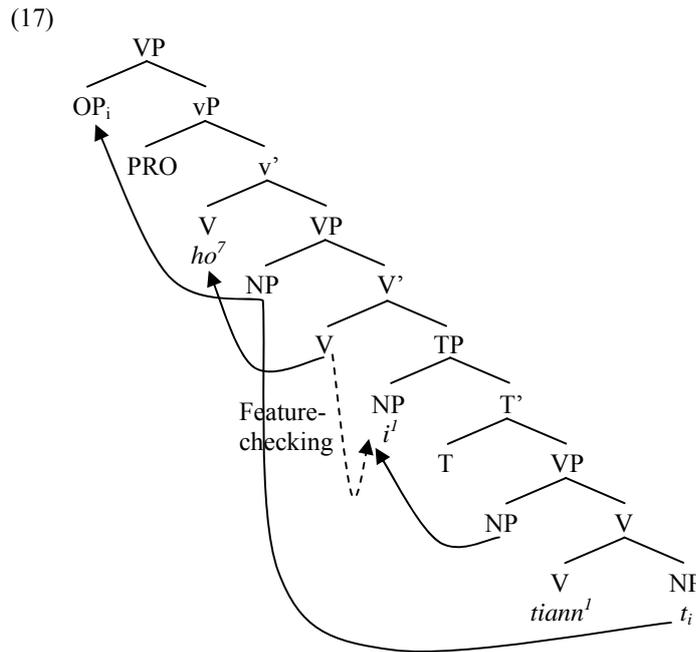
Then I show I-phrase boundary of (14b) as follows:

- (16) (iGua² tshiunn³ cit⁸-siu² kua¹) (ho⁷) (i¹ tiann¹)
 I sing one-CL song Ho ~~he~~ listen
 [我 唱 一首 歌 [OP_i [Pro ho⁷ [i¹ 聽 t_i]]]]
 'I sing one song for him to listen to.'

According to Trubetzkoy (1939), glottal stop is often used as boundary marker to separate the different intonational phrases. That is, compensatory lengthening of *ho⁷* realizes as **a boundary marker and a silent time slot, not lengthening**.

4.2 A-Movement

The syntactic differentiations between (15) and (16) are vital to our assumption. But the distinctions are not so clear-cut. We should focus on the construction [Pro *ho⁷* [*i¹* *tiann¹* [*t_i*]]] to clarify it. In (15), we can see the subject of embedded clause *i¹* *tiann¹* move to object position to be checked feature by the root verb *ho⁷*. I show it as (16):

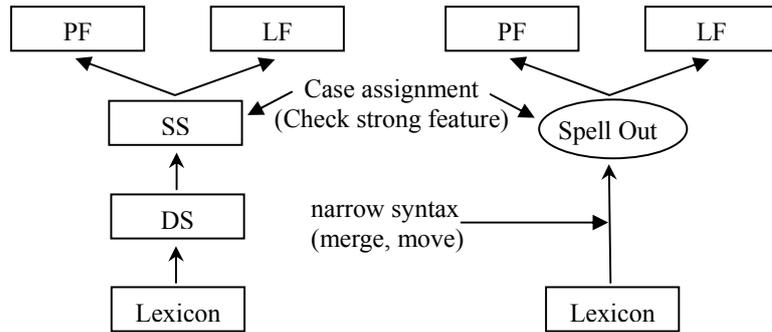


The key point is that *i¹* *tiann¹* is a direct object-like properties of the ECM (Exceptional Case Marking) subject due to the fact that it is governed and assigned case by the root verb in GB theory. And the case assignment is overt

movement in GB theory.

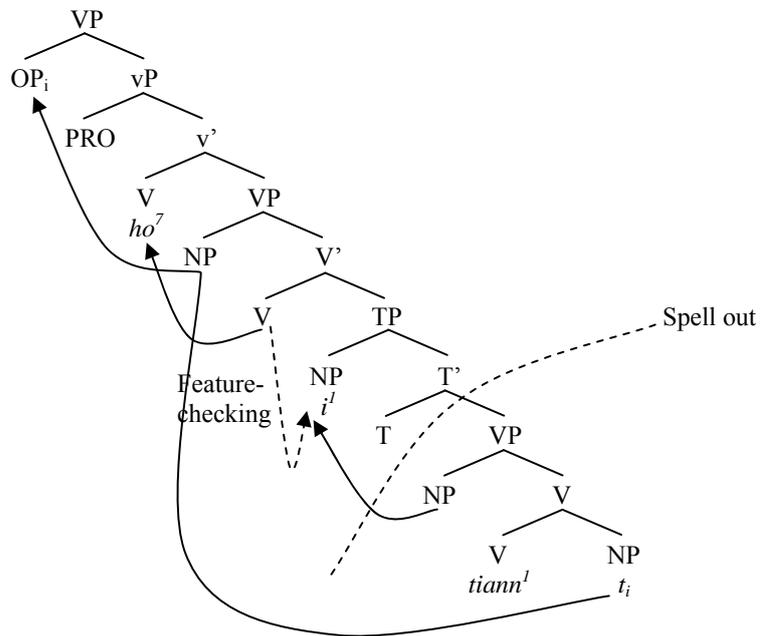
In MP, it is feature-checking now (Chomsky 1995):

(18)



OK, we can turn back to (17). If case assignment applies before spelling out, i^l 伊 will spell out with ho^7 , but not with $tiann^l$ 聽. I show it as follows:

(19)



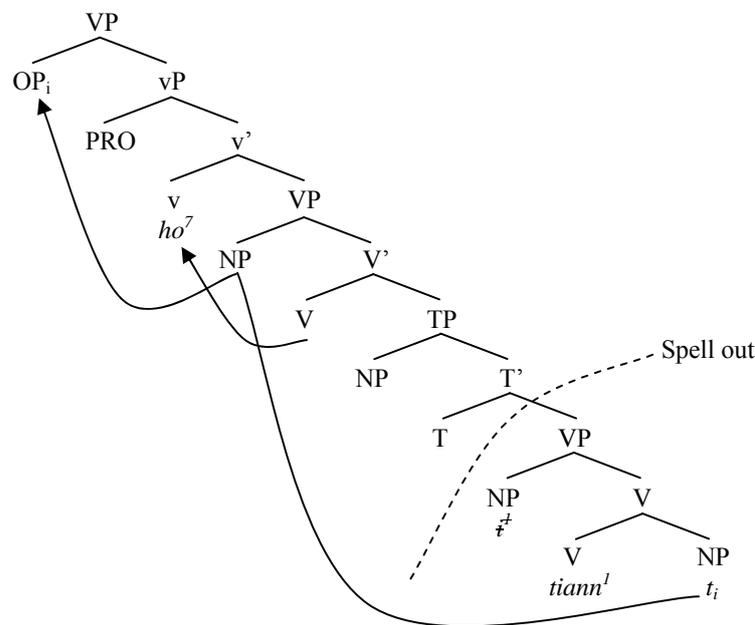
As (19) mentioned, we can explain (15) appropriately. Now, we move to (16).

Where they are different? A-movement is realized in (15) but not in (16). That is Merchant's suggestion (2001), the redemptive effects of sluicing, is reminiscent of other instances of "repair by ellipsis" discussed by Lasnik (2000, 2001, 2002).

In feature-Checking theory, strong feature means that the feature is uninterpretable at the PF interface and hence must be checked before Spell-out (Chomsky 1993).

Normally, the feature is checked by overt movement. However, when the offending feature is part of an elided constituent, the absence of the associated checking movement should not matter, as the strong feature has been deleted along with the ECM subject and therefore does not reach the PF interface to cause a crash. See as follow:

(20)



Main idea is a PF crash will be avoided by deletion. Pronoun i^1 ~~伊~~ which is deleted is invisible to the PF interface and therefore can not cause a crash here.

Syntactically, the story is ending. We repair the offending feature by deletion, and the movement would not happen. The sentence will spell out as (16):

- (16) (iGua² tshiunn³ cit⁸-siu² kua¹) (iho[?]) (i¹ tiann¹)
 I sing one-CL song Ho he listen
 [我 唱 一首 歌 [OP_i [Pro ho[?] [~~伊~~ 聽 [t_i]]]]
 'I sing one song for him to listen to.'

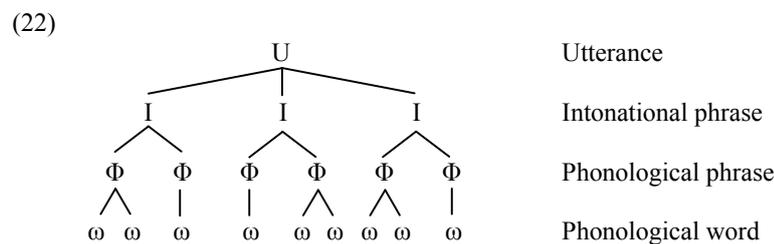
Phonologically, the story is not ending. Because the silent time is not a boundary marker, we need another boundary marker to separate I-Phrase. So the glottal stop occurs (Trubetzkoy 1939). I will discuss this question from phonological aspect.

4.3 Prosodic Computation

Following Selkirk 1984 and many other works, López (2009) assume that syntactic structures map onto prosodic tree, which in turn feed PF. Thus, the output of syntactic component (usually referred to as the computational system of human language (C_{HL})) although more than one computational system, which he refers to as P(rosodic)-computation, which feeds PF.

$$(21) \quad C_{HL} \rightarrow \text{P-computation} \rightarrow \text{PF}$$

Still under the inspiration of Selkirk (1984), he assumes an architecture that includes phonological words, phonological phrase, and intonational phrase, which bundle together in an utterance, as illustrated in (22). Prosodic trees have been found to be exhaustive (Nespor and Vogel 1986) and non-recursive (Selkirk 1984). For present purposes, we can take exhaustively and non-recursion to be inviolable constraint.



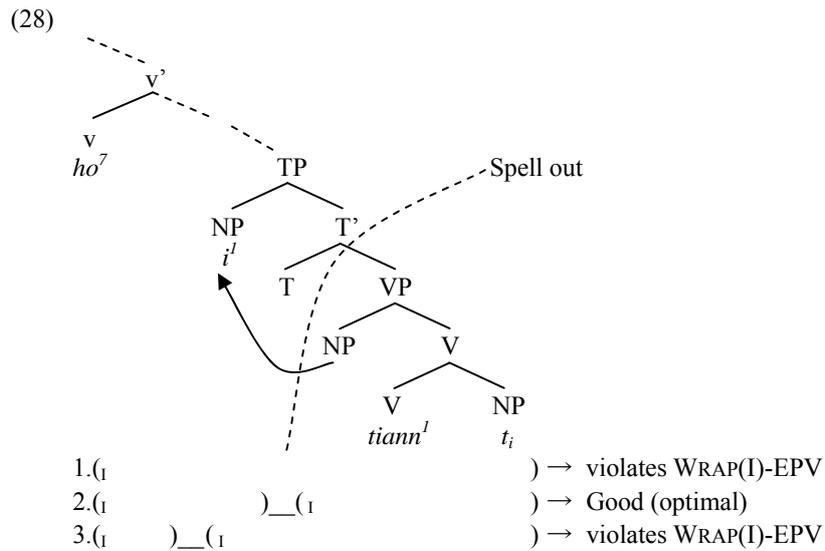
He assumes a bottom-up computation of prosodic structure that recapitulates the bottom-up construction of syntactic trees.

Two constraint families are pertinent to the present discussion. One is the *ALIGN* (which goes back to Selkirk 1986) which forces the boundary of a syntactic XP to be coterminous with the boundary of a phonological constituent. The other is *WRAP* (Truckenbrodt 1999) which says that every syntactic phrase with a lexical head must be contained in a phonological constituent.

One way of interpreting this procedure is to assume every prosodic unit has an “edge feature” the same as or similar to what Chomsky (2005) proposes to account for the Merge operation in narrow syntax. The erection of prosodic architecture is guide by No Tampering Condition (NTC), which forbids a prosodic unit be altered in the middle, and the limitation is derived from general constraint *Structure, which seeks to avoid the construction of any structure (Prince and Smolensky 1993/2004; Truckenbrodt 2005).

5.2 Proposal

(28) and (29) illustrate the situation I have just discussed. In (28), there is no silent time slots occurring by eliding. So we only observed WRAP(I)-EPV violation. If an intonational phrase includes more or less than a whole VP, WRAP(I)-EPV is violated, as in (28.1) and (28.3).



If an intonational phrase includes more or less than a whole VP, WRAP(I)-EPV is violated, as in (29.1) and (29.4). In (29.2), if there is no additional boundary marker, OCP (silent) is violated. And if the boundary marker do not located in the right edge of intonational phrase, ALIGN(I)-[?] will be violated, as in (29.5). (29.3) is optimal candidate, and it only violates the lowest ranking constraint *_I.

verb, then the /ho/ will NOT be added with a glottal stop. E.g. 我泡茶^{ho⁷} 喝^(lim¹).

That is a good observation. Second part of this paper notes that shorter pause (< 90ms) usually occurs with another boundary marker, like glottal stop or contour tone, to mark intonational phrases in utterance. In this case, it realizes as a boundary marker and a silent time slot either. But the boundary marker is not glottal stop, it is a contour tone. I think it is another evidence that boundary marker must occur. And the case is a free variation. It is to say that boundary marker realizes as glottal or contour tone individually.

Sure, it reminds me that we may have another constraint to maintain citation tone.

(32) MAX-T

The citation tone in input should realize in output.

(33) 3rd Pronoun Ellipsis(revised)

Input:VP(ho ⁷)VP(__ tiann ¹)'	WRAP(I) -EPV	OCP (silent)	ALIGN(I)-[?]	*?	MAX-T
a. (i ho ⁷ tiann ¹)	*!*				
b. (i ho ⁷) (i tiann ¹)		*!			
c. (i ho ⁷) (i tiann ¹)				*	*
d. (i ho ⁷) (i tiann ¹)	*!*	*			
e. (i ho ⁷) (i ? tiann ¹)			*!	*	

And she also mentions that it is not common to see an I-phrase occurring with only one syllable. The explanation is that I narrow down the input to embedded clause to make the tableau simply. I have just exaggerated the I-phrase implement. In common, ho⁷ is only a prosodic phrase. And it will spell out with upper-VP.

Thank for another commentator¹³, he provides another proposal by Lasnik (2008) to support my claim. Lasnik argues case filter is PF requirement in the article.

An anonymous reviewer¹⁴ may be confused by the definition., arguing that a glottal stop is inserted in order to repair some ill-formed structure in TSM in this paper. And two interesting points are put forward. First, compensatory lengthening refers to the phenomenon whereby an empty timing unit is (re-)taken after deletion/drop of segmental substance. There is nothing like that as far as the issue in question is concerned. Second, a glottal stop is not moraic in Taiwanese, meaning that it is not associated with any timing unit.

In first comment in question, we should go back to the conclusion in 4.2. According to Trubetzkoy (1939), glottal stop is often used as boundary marker to separate the different intonational phrases. That is, Compensatory lengthening of ho⁷ realizes as a boundary marker and a silent time slot, not lengthening.

¹³ Chao-kai Shi.

¹⁴ I think for his profound comment and penetrating insight, and am grateful for his reviewing.

Maybe I misled reader to wrong way. Checking the part section 4.1, the conclusion is only based on the face-value in result, and the environment for compensatory lengthening of *hoʔ* is adequate. I should clarify is the compensatory lengthening will happen if there is no boundary marker after that. The glottal stop occurs in intonational phrase level (see 4.3), and bleeds the environment for compensatory lengthening of *hoʔ* in result. Stated another way, we can treat them as bleeding rule. In result, there is no compensatory lengthening in face-value, but its environment is fulfilled if we ignore the syntactic factor. Just one example should suffice to illustrate. That is interaction between tone sandhi and morpheme boundary. The paper's title describes compensatory lengthening as the environment between input and output. The process comprises two stages. It is composed of boundary differentiation and compensatory lengthening. And the former bleeds the latter, and triggers the former silent time slot (a boundary marker) transferring to a glottal stop.

As was mentioned above, the glottal stop is transferred from a boundary marker, so second question about the moraic of glottal stop or not is no longer a matter.

Another question focus on OCP (silent), and the reviewer suggests the constraints should come up with well-motivated argument. Why silence is subject to an OT constraint?

To answer this question, well-motivated argument, we may trace back to the development of the modern phonology. It is generally recognized that the separation of phonology and phonetics occurred as a result of the raise of structuralism, taught initially by Ferdinand de Saussure (1857 - 1913) and Jan Baudouin de Courtenay (1845 - 1929) but fully developed in phonology by the Prague School. N.S. Trubetzkoy (1890 - 1938) (Trubetzkoy 1933, 1939), a leader of the Prague School, differentiated between

...the study of sound pertaining to the act of speech (phonetics) ... and the study of sound pertaining to the system of language (phonology).

The emphasis on system or the relationship between speech sounds rather than on the substance of those sounds represented a new concern and one which seemed at the same time to open up new frontiers for phonological study and to liberate the of speech sounds from physical phonetics and all the burdens of its natural sciences method. For example, underlying representation is the well-known achievement.

No matter what, from generative phonology, through autosegmental phonology, to Optimal theory, the basic idea of phonology never change. More specifically, it refers to **psychological realism**. Notice that the notion of OCP (silent) is functionally equivalent to what Trubetzkoy differentiated between phonetics and phonology. The assumption is not unprecedented, it and have certain aspects in common with psychological realism. So syntax analysis in this paper is a crucial first step toward demonstrating the psychological realism.

Other examples about psychological realism abound. The nasalization of some Mandarin Chinese is proven the existence of the underlying form /iən/ by

capering with non-nasalization form [in] and nasalization form [iñ]. And an new explanation for dissimilation, like Grassmann's Law, was due to listener variation, (Ohala 1991), but not speaker variation, such as 'ease of articulation' (Müller 1864) or 'energy cost' (Ladefoged 1984).

At last, the reviewer asks why is a glottal stop a boundary marker in TSM? Is there any other independent evidence? I think this is a very good question. If we can find the boundary marker occurred here, we should find it again in resembled cases. Across the intrinsic restraint of language itself is undoubtedly one of most difficult tasks facing a linguist. Before answering that, we can think over meaningful sentences by Hall (1954) is concerning about this topic:

Real language are not minimal redundancy codes invented by scholars fascinated by the power of algebra, but social institutions serving fundamental needs of living people in a real world. [In trying to understand] how human beings communicate by means of language, it is impossible for us to discount physical considerations, [i.e.,] the facts of physics and physiology.

According to Trubetzkoy (1939), glottal stop is often used as boundary marker to separate the different intonational phrases. Implied in the definition is non-language, that is, universal tendency. Other examples in this category include 'p' presenting a suddenly stop impression in 'Oops'. Examples from literature about non-language tendency are findings of several acoustic studies on the influence of surrounding consonants on vowel quality (Lindblom 1963). When the syllable (some of them nonsense) was shorter, the formant frequencies of the vowel (measured in the middle of vowel) shifted towards those characteristic of the boundary between the consonant and the vowel. Keeping in mind the rules of thumb that vowel height correlates inversely with F1 and vowel frontness with F2, the figure shows that the apical environment, d_d, had the greatest fronting influence on back vowel.

The conspicuous effect that apical have on back vowel has been documented for language as well: English (Stevens, House, and Paul 1966), France (Chollet 1976), Japanese (Kuwahara & Sakai 1972).

It may be no more interesting or fruitful to try to find any other independent example than it is to enquire further into why the glottal stop can be perceived as boundary marker in non-language or language cases in laboratory-based speech perception experiments.

6. Conclusion

Let me just briefly summarize the key issues. The occurrence of glottal stop is determined by the syntactic constituents and OCP, which is avoiding two silent time slots sequence. And glottal stop is always located in the right edge of intonational phrase. I guess that we still have glottal stop coda occurring in weakening entering tone of TSM, but not onset. In general, a conditional change does not trigger a new category.

This assumption deals with non-pronunciation pause by phonological style.

Syntactic analysis is carried out to prove existence of the silent time slot. Phonological one is conducted to depict what happen in the process from post-syntactic stage to PF. Based on attested evidences, I propose that the compensatory lengthening of *ho*⁷ is a boundary marker plus silent time slot implemented in phonology-syntax interface.

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