

Rethinking the Syntactic Constraints on Fuzhou Tone Sandhi:
A Distributed Morphology Based Approach

Russell Tanenbaum

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Edith Aldridge
Karen Zagona

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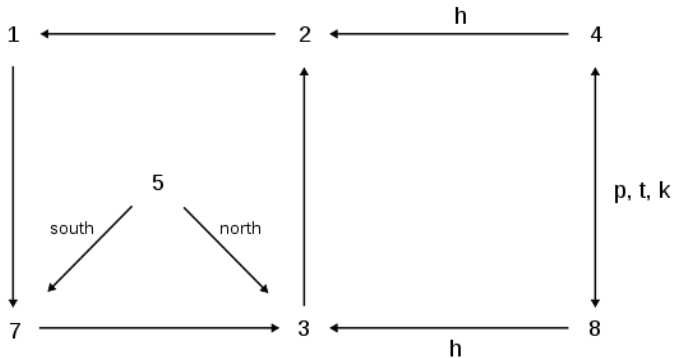
1. Introduction

Tone sandhi phenomena - the combinatorial patterns that govern how individual tones are realized in speech - are a common feature of Chinese. The Min dialects in particular are known for the complexity of their tone sandhi. In Xiamen, sometimes referred to as Southern Min or Taiwanese, the intrinsic "citation" tone of a syllable that surfaces when it's pronounced in isolation or at the end of a phrase will shift to its individually assigned "sandhi" tone whenever the syllable is not phrase-final. For instance, an intrinsically first tone syllable (which is high-level, or "55" in Y.R. Chao pitch-notation) will change to seventh tone (mid-level, or "33") whenever some other syllable follows it in a phrase, as (1) illustrates.

- (1) a. /tiong55 'middle' + chhiu55 'autumn' / = [tiong33chhiu55] 'mid autumn'
 b. /tsin55 'very' + ki13 'strange' / = [tsin33 ki13] 'very strange'

This culminates in a quasi-circular pattern among the tones of Southern Min, where in sandhi position first tone becomes seventh tone, seventh third, third second, and second first, as schematized below in (2):

(2) Xiamen Tone Circle (from: Li, 2000)



By comparison, the tone sandhi of Fuzhou (a.k.a Eastern Min) seems to be even more complicated. For one thing, the values of the Fuzhou sandhi tones are a function not only of the syllable's own citation tone value but of the following syllable's as well. For example, a Fuzhou high-falling [52] toned syllable will change to high-level [44] when followed by another high-level toned syllable, but will change to mid-falling [31] when followed by a syllable of any of the remaining six tones.

- (3) a. /uong52 'yellow' + ngua44 'flowers'/ = [uong44ngua44 'yellow flowers']
 b. /lau52 'emit' + kang242 'sweat'/ = [lao31kang242 'to sweat']

Generalizing between both dialects, then, we can say that the common necessary factor for sandhi to occur in Min is that there be some toned syllable after the syllable in question, only in Fuzhou the *value* of that trigger tone is also taken into account. Pitch values for the seven tones of Fuzhou are listed with examples in (4) and the their sandhi behavior is given in (5).

(4) Seven Citation Tones of Fuzhou Dialect (from Hung 1987)

a. 44	[tsy]	'book'
b. 52	[t'au]	'head'
c. 31	[kuong]	'speak'
d. 213	[kui]	'expensive'
e. 242	[puong]	'rice'
f. 23	[p'aq]	'hit'
g. 4	[sieq]	'eat'

(5) Fuzhou disyllabic tone sandhi patterns (from Hung 1987)

sandhi tone of 1st syl 1st syl	2nd syl								
		44	52	31	213	242	23	4	
44, 213, 242		44		52			44		
31, 23		31		45	44		31		
52, 4		44		31					

Furthermore, not only does the tone of a Fuzhou syllable appear to be more deeply affected by its *phonetic* environment than the equivalent syllable in Xiamen, but syntactic and/or semantic factors also seem to play a greater role in Fuzhou than in Xiamen in determining sandhi patterns. Hung (1987) was among the first to observe these so-called "syntactico-semantic constraints" on Fuzhou tone sandhi, arguing that whether or not tone sandhi occurred between two elements was a function of whether those elements were in a head-modifier or head-argument relationship. Noted Hung: "Modifiers (but not arguments) preceding the head can undergo tone sandhi, as can heads preceding arguments (but not modifiers)." These four possibilities are demonstrated in (6) below, with absence of tone sandhi marked by <#>:

- (6) a. [[tsa] k'oung]VP (modifier + head)
 early sleep
 [31>44 213]
 'sleep early'
- b. [[nguai] k'oung]S (argument + head)
 I sleep
 [31 # 213]
 'I sleep'
- c. [k'ang [tieng - nging]]VP (head + argument)

see movie
 [213>31 242>52 31]
 'see a movie'

- d. [k'ang [so - ui]]VP (head + modifier)
 see one time
 [213] # [4>31] 52]
 'see once'

Hung's "Adjunct/Argument" approach serves as a good starting point for an investigation into the relationship between Fuzhou tone sandhi and underlying structure, but it leaves much to be desired. For one thing, it's unclear how a phonological rule would have direct access to semantic concepts like "argument" or "adjunct" in a model of grammar where phonology and semantics are located in separate modules that are linked through narrow syntax. Furthermore, there are a number of other sandhi-related phenomena for which the approach either makes incorrect predictions or no predictions, such as verbs with resultative verb constructions, verbs with complex nominal objects, and nominal-internal sandhi (i.e., between numerals, classifiers and nouns).

Chan (1998) points out many of these shortcomings inherent in Hung's approach, and advocates instead for an account based on lexical government. Drawing on a formalism and framework that goes back to Selkirk's (1986) work on syntactically determined phonological phrase boundaries, Chan lays out the conditions on the Fuzhou Phonological Phrase as provided in (7). Whenever any head is not lexically governed (i.e., m-commanded by a different, lexical head), she claims, then a tone sandhi barrier is marked to the head's immediate right.

(7) Fuzhou Phonological Phrase {right, X^o}, where XP is not lexically governed

This is an improvement theoretically from the Argument/Adjunct approach, in that it relies less on semantic notions and more on syntactic configurations, but does not, in fact, provide any great advancement in terms of descriptive adequacy. Furthermore, the theoretical cost of the notion of government has come to be seen in the Minimalist Program as outweighing its benefit (Chomsky 1993; 1995).

In what follows, I propose a new account based on distributed morphology (DM), the central claim of which is that the presence of tone sandhi in Fuzhou indicates that the two or more elements comprising the tone sandhi domain have been joined into a single X° through either compounding or morphological merger (based on Harley 2009; Embick and Noyer 1999). This conforms with the longstanding observation that Fuzhou tone sandhi is a word-level phenomenon, and manages to capture in a principled way the word-internal asymmetry in (8), which previous structurally-grounded attempts, namely the Lexical Government approach, could not.

- (8) a. t'ie taing i
 23>44 242 0
 iron hard NOM
 'iron-hard'
- b. t'ieq tso i
 23 # 213 0
 *23>44 213 0
 iron make NOM
 'iron-made'

(from Hung 1987; 1992:66)

The next section provides a more in-depth review and critique of the Adjunct/Argument approach and the Lexical Government approach, as expounded by Hung (1987) and Chan (1998), respectively. In Section Three, I elaborate on my own distributed morphology (DM)-based analysis, and its implications for the structure of the Fuzhou VP and DP.

Section Four deals with instances of optional tone sandhi, namely the case of pronominals, where I argue that the observed optionality may be the result of competing structures. Section Five concludes.

2. Previous Accounts

2.1. Hung (1987)

In Hung's (1987) dissertation, he insightfully observes that pre-head modifiers and post-head arguments condition tone sandhi (or "form a tone group") in Fuzhou, but not pre-head arguments or post-head modifiers. (Note that the equals sign indicates sandhi on the preceding syllable, while the pound sign indicates lack of sandhi on the preceding syllable.)

(9) Hung's Generalization (schematization from Chen, 1990: 42))

adjunct = head
argument # head
head = argument
head # adjunct

Relevant examples of these four combinations, from Hung 1987, are provided below.

(10) adjunct = head

- a. tuai = po-lo
'big grapes'
- b. kuo = lo-riq
'too honest'
- c. tse = k'au
together go
'to go together'

(11) argument # head

- a. tsy # tseing kui
 books very expensive
 ‘books are very expensive’

- b. i # le-k’uong
 he Asp-sleep
 ‘he is sleeping’

(12) head = argument

- a. k’i = ts’uo
 build house
 ‘to build a house’

- b. e = siu-zui
 know swim
 ‘to know how to swim’

(13) head # adjunct

- a. keing # loey zuo
 tall six feet
 ‘six feet tall’

- b. t’iu # ia eing
 jump very high
 ‘jump very high’

In addition to these syntactico-semantic conditions, Hung importantly points out that there is a prosodic constraint that also play a role in the licensing of tone sandhi¹. Namely, polysyllabic constituents to the left of any trigger are categorically barred from being candidates for tone sandhi. Thus tone sandhi is blocked between the last two syllables in (14) but not in (15).

¹ But as I will point out on the discussion on adverbs in Section 3, this constraint is not entirely inviolable.

(14) [suong - seing] nguai
 [44>52 213] # [31]
 believe me

(15) sie [kie - loung]
 [44>31 44>52 242]
 eat egg

(Hung 1987)

Any researcher solely interested in the syntactic constraints on Fuzhou tone sandhi must therefore exclude from the data set cases such as (14), where a polysyllabic verb is paired with a monosyllabic object, pre-emptively blocking sandhi.

Despite its strengths, Hung's Argument/Adjunct approach runs into some hefty empirical obstacles, especially when it comes to verbs that are followed by nominal arguments - arrangements which the theory predicts ought to condition sandhi on the verb. This prediction isn't always borne out. Verbs followed by bare NPs, as in (16), do undergo tone sandhi, but when that NP itself comes with a quantifier, determiner and/or adjective, as in (17), sandhi is blocked².

- | | | | |
|---------|--|---|--|
| (16) | sieq = po-lo
'eat grapes' | / | me = tsy
'buy books' |
| (17) a. | sieq # tsi zieq # po-lo
eat this CL grape
'eat this grape' | / | me # tsi uong # tsy
buy this CL book
'buy this book' |
| b. | seiq # suo zieq # po-lo
eat one CL grape
'eat one grape' | / | me # suo uong # tsy
buy one CL book
'buy one book' |
| c. | sieq # tuai po-lo
eat big grape
'eat big grapes' | / | me # ku tsy
buy old book
'buy old books' |

² The phrases in (17) actually contain two tone sandhi barriers, but I'm only interested in the first one at the moment. The second barrier will be touched upon in section 2.2.

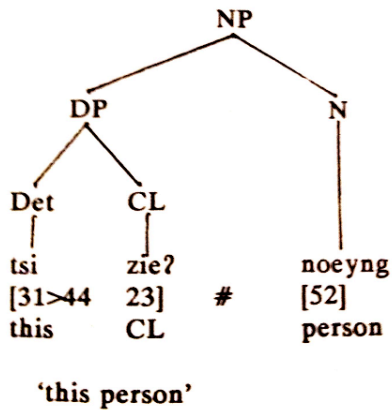
The Fuzhou phrases *tsi uong tsy* 'this book', *suo uong tsy* 'one book', *ku tsy* 'old book' are each of them just as much an argument as *tsy* 'books' is, and therefore would be incorrectly predicted by Hung to form a tone group with the verb. We could give Hung the benefit of the doubt and entertain the possibility that his generalization was meant to describe zero-level, rather than maximal, projections. And strictly speaking, yes, a word like *ku* 'big' in (17c) is a modifier, but it's modifying the noun that follows it rather than the verb that precedes it. It seems to run against the very spirit of a syntactico-semantic-based approach like Hung's to say that the function of a part should supersede the function of the whole.

The Argument/Adjunct approach runs into even more difficulty when tasked with explaining the sandhi effects observed within nominals. As seen in the data in (17), sandhi regularly occurs between determiner and classifier or numeral and classifier, but not between classifier and noun. More examples are provided below in (18).

- (18) a. *hi = lau # puling*
 this CL fly
 'this fly'
- b. *suo = a # ts'ia*
 one CL car
 'one car'

It is unclear how the three-way distinction of Head vs. Argument vs. Adjunct applies when dealing with the relationship among determiners, numerals, classifiers and nouns. Hung appears to follow Chan (1998) in assuming that, syntactically, the determiner and classifier in a phrase like (18a) form a single determiner phrase, which itself is the specifier to the noun, as shown in (19).

(19)



If so, then is this specifier to be viewed as an argument or an adjunct with respect to the noun head? Semantically, *tsi-zieq* 'this-CL' doesn't appear to be an essential piece to any conceptual whole, so one would be tempted to call it a pre-head adjunct, but in that case Hung's approach would predict sandhi to be present on the classifier *zieq*, contrary to fact. Even when the Fuzhou noun phrase is updated to accommodate the now standardly assumed DP hypothesis (Abney 1987), such that the determiner and classifier form a functional head selecting the noun, incorrect predictions still persist. The noun in such a structure would fit Hung's own criteria for being classed as a post-head argument, since it is a "strictly subcategorized complement"³, without which the head is semantically and syntactically incomplete", and is therefore predicted, again incorrectly, to trigger sandhi on the classifier.

Apart from the abovementioned empirical inadequacies, the Argument/Adjunct approach has the theoretical drawback, as mentioned earlier, of assuming an all-too-direct connection between semantics and phonology. In the next subsection, I review Chan's (1998) attempt at a more theoretically-sound account of Fuzhou tone sandhi phenomena.

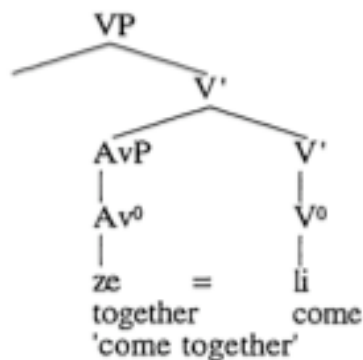
³ Classifiers in Fuzhou, as is common for Chinese dialects, subcategorize for particular sets of nouns. As seen in (18) *lau* subcategorizes for animals, and *a* for vehicles.

2.2 Chan (1998)

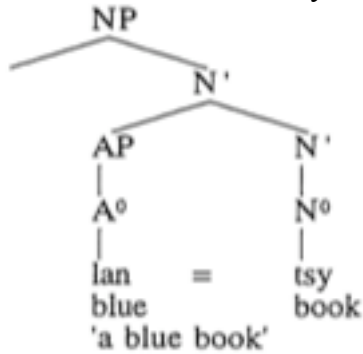
Lily Chan, in her 1998 dissertation, which deals with both prosodic and syntactic constraints in Fuzhou TS, argues for a lexical-government-based account of the facts. Essentially, she argues that any toned syllable of a Fuzhou utterance, when following by another toned syllable, will change to its sandhi tone according to the pattern in (4) unless a barrier is in place to block it. The Fuzhou Phonological Phrase Rule in (6) inserts such barriers at the right edge of any X° whenever its maximal projection is not lexically governed (Chan 1998:167).

For cases of adverbial and adjectival modifiers, Chan argues that the observed tone sandhi is expected to occur so long as we assume that the AdvP and AdjP, respectively, are adjoined to V' and N' , and therefore fall within the domain of V° and N° , as posited in (20) and (21) below (from Chan 1998: 168).

(20) Lexical Government analysis of [Adv = V] sandhi



(21) Lexical Government analysis of [Adj = N] sandhi



Chan then points out that verbal heads are, as a rule, not lexically governed, insofar as their maximal projections are immediately dominated by INFL, which she takes to be a functional category. Her theory therefore predicts that a tone sandhi barrier will appear between V° and anything that comes after - in other words, that V° will keep its citation tone. This manages to capture (17), as well as postverbal frequentatives (5a), postverbal adjectivals (12b), and postverbal locatives as in (22):

(22) soi # tsu-uai
 sit this place
 'to sit here'

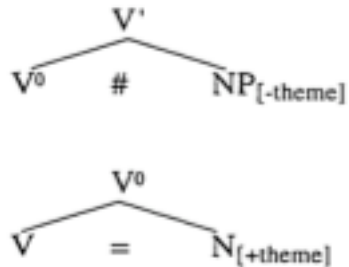
Yet the same tone sandhi barrier is now incorrectly predicted to occur after all verbs, including simple V-O combinations like (11a), repeated below.

(11a) k'i = ts'uo
 build house
 'to build a house'

To solve this problem, Chan assumes that items like *ts'uo* 'house' in (11a) are bare nouns, and additionally that they are (somehow) marked as [+theme]. These two factors allow such objects to incorporate into the verbs that select for them before the barrier insertion

takes place. Meanwhile, sandhi is still blocked in (22) because it is marked as [-theme]. Her schematization is shown in (23).

(23)



Such labeling appears somewhat ad-hoc, and is moreover at odds with a great deal of evidence that suggests that thematic roles, such as theme, agent, goal, are assigned as a consequence of the noun's structural position, rather than being primitives. (This is the claim of Baker's (1988) Uniformity of Theta-role Assignment Hypothesis, known as UTAH.) Furthermore, "government" as a concept is no longer required in a minimalist framework, where the mechanisms of derivation have been reduced to bare essentials such as Merge and Move.

In my analysis, presented in the next section, I dispense altogether with the notion of government and tone sandhi barrier insertion and instead understand the presence of tone sandhi simply as indicative that the elements involved form a word. The lexical/functional distinction is still relevant but recast in terms of the inter-combinability of l-morphemes and f-morphemes. Chan's idea of incorporation, for its part, is still appealed to as a syntactic explanation for certain sandhi effects, but I show that other post-syntactic operations, such as morphological merger, are still needed to account for all the effects.

3. Proposal

As it is with cosmology, so it is with linguistics: the simplest explanation is usually the correct one. Rather than appeal to imprecise semantic distinctions such as arguments versus adjuncts, or to theoretical notions like lexical government, rooted in the assumptions of the now somewhat dated government and binding theory, instead I approach the problem from the perspective of DM (Halle and Marantz (1993), Embick and Noyer (1999), Harley (2009)) and pursue the hypothesis that the presence of Fuzhou tone sandhi is a result of the two syllables in question forming a single morphosyntactic word⁴ (Embick and Noyer (1999:279)). So whereas Xiamen tone sandhi phenomena are a reflex of phrase boundaries (Lin, 1994), Fuzhou tone sandhi phenomena are a reflex, in essence, of word boundaries. In the following subsections, phonological and syntactic evidence will be examined from the Fuzhou verbal and nominal domains in support of this hypothesis.

3.1 Sandhi in the VP

The next four subsections will discuss sandhi phenomena related to the Fuzhou VP. First, I examine two contexts where sandhi regularly occurs: (i) between low adverbs and verbs and (ii) between verbs and bare-noun objects. Evidence is presented suggesting that both be analyzed as cases of words created via morphological merger. Conversely, I attribute the *lack* of sandhi between (i) verbs and modified or non-thematic objects and (ii) verbs and their verbal resultative complements, to there being intervening structure, in the form

⁴ This is based on Embick and Noyer's technical definition: "At the input to Morphology, a node X° is (definitionally) a *Morphosyntactic Word* (MWD) iff X° is the highest segment of an X° not contained in another another X° ". This will be elaborated on below.

of either null or overt functional heads, which bar post-syntactic processes like morphological merger from taking place.

3.1.1 Adv + V

Within the Fuzhou VP, there are certain places where sandhi regularly occurs, and certain places where it regularly fails to occur. For instance, sandhi regularly occurs between nearly all monosyllabic - and even certain polysyllabic - adverbs and the verbs that follow them. Examples, most of which come from Li (2002), include the following:

(24)

- a. k'e = k'o
quick go
'to go quickly; to go soon'
- b. kuong = min
crazy sleep
'to sleep crazily (= to have nightmares)
- c. ie = kong
wildly talk
'to talk nonsense; to lie'
- d. tse = sieq
together eat
'to eat together'
- e. t'ying = tso
again do
'to do again; redo'
- f. muong-ngo = tsei (k)ang
casually try see
'to casually try; to just give it a try'
- g. ti-lao = (k)ang (ti-lao = Mandarin *yizhi*)
nonstop read
'to read nonstop'
- h. tang-to = loeyng

contrary wear
'to wear (sth.) inside out'

There are also a number of adverbs which do not form a tone sandhi domain with the verbs they precede:

(25)

- a. ia-ho # k'o o
fortunately go PERF
'fortunately (sb.) went'
- b. ta-ta # puo-tiq (ta-ta = Mandarin *ganghao*)
incidentally need
'to incidentally need (sth.)'
- c. tsing ts'uong # tong ngy (tsing ts'uong = Mandarin *haoxiang*)
apparently fall rain
'to apparently be raining'
- d. seu-seu # tuong li
often return
'to return often'

Examples like (24e-g) show that, contrary to Hung's (1987) assertion concerning prosodic constraints, certain disyllabic adverbs like *muong-ngo* 'casually', *ti-lao* 'incessantly' and *tang-to* 'inside-out, contrarily' are capable of forming a tone sandhi domain with the verb that follows. But they are in the minority, as most polysyllabic adverbs do not. Not surprisingly, the adverbs that undergo sandhi tend to relate to manner or aspect (*quickly, wildly, together, again, nonstop*) while those that are speaker- or discourse-oriented (*fortunately, incidentally, apparently*) generally appear in isolated sandhi domains. The interpretative differences between the adverbs that do and don't undergo sandhi suggest a difference in their base merge positions (c.f. Cinque (1999)).

If such a difference exists, we would expect to find adverbs where the alternation between the presence and absence of sandhi correlates with an alternation between sentential and verbal interpretations. The adverb *ngaing* 'lit: hard' demonstrates precisely this type of correlation between sound and meaning. When it denotes deontic necessity, as in (26a), or epistemic certainty, as in (26b)⁵, it preserves its isolation tone; when it indicates that things are done in a rash, forceful manner, as in (26c), it takes a sandhi tone.

(26) (From Li 2002: 262)

- a. ko i noeyng tso, i ngaing # puo tsuo
tell him NEG do, he must will do
'I told him not to do it, but he just had to do it'
- b. tsia ua ngaing # si i koung i
these words must be he say MOD
'These must be his words'
- c. k'ui muong mo so-lie ngaing = k'ui e k'ui ngai o
open door NEG key forcefully open will open broken go
'Opening the door without a key and forcing your way in will damage it'

The very fact that *ngaing* 'definitely' precedes the modal *puo* 'will' in (26a) is by itself strong evidence of it occupying a fairly high position in the structure. As for the position *ngaing* 'forcefully' in (26c), one hypothesis would be to assume that it merges as sister to the root *k'ui* 'open', forming a lexical compound--an explanation which might perhaps apply to the Adv-V pairs in (24). If (24a-h) are indeed words rather than phrases, then tone sandhi is expected to apply as a matter of course. One avenue of evidence leading in that direction is the observation that the meaning of *ngaing k'ui* 'force open' completely predictable from its composition. Literally *ngaing* means 'hard', so the semantic sum,

⁵ The fact that this sentence involves a copular construction may also influence the observed lack of sandhi on the adverb.

'force open', is more than just the sum of the semantic parts, 'hard' + 'open'. Such idiomatic meaning is typical of many Fuzhou adverb-verb pairs, like (24a, b, c, f) above, and seen also in many English adverb-verb compounds like *sweet-talk* (= 'to convince through charisma') and *slow-cook* (= 'to stew'). Another reason to believe that items like (24a-h) could be compounds is the fact that the adverb-like element in each of them resists reduplication and *ia*-intensification:

- (27) a. *k'e k'e k'o
 quick quick go
- b. *ia k'e ko
 very quick go

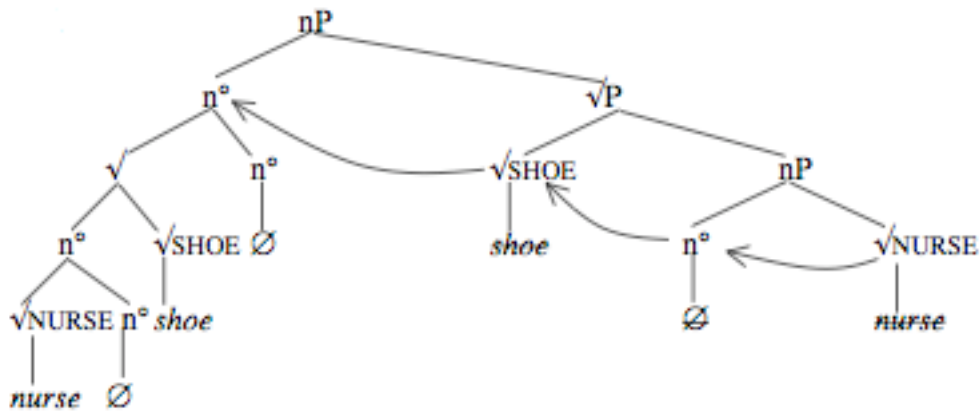
This is not true of independent, syntactically-derived adverbs, as in (28), which allow intensification and reduplication, and also exhibit no idiomatic meaning or tone sandhi:

- (28) a. k'e k'e # i k'o
 quick quick MOD go
 'to go real quickly'
 *'to go real soon'
- b. ia k'e # i k'o
 very quick MOD go
 'to go very quickly'
 *'to go very soon'

Perhaps, then, all cases of Fuzhou Adv+V combinations that result in sandhi on the adverb are simply instances of compounding, and should be subjected to the same analysis as canonical compounds, like *time travel* or *water nozzle*; or *ngy kou* 'fish bone', as a Fuzhou example. Harley (2009) makes an interesting case for this in English, linking together what she calls *primary compounds* (e.g., *nurses shoes*, *film buff*), *synthetic*

compounds (e.g., *truck driver*, *wheat-growing*), and *modification-synthetic compounds* (e.g., *fast-falling*, *snappy-looking*). Her analysis for one of the primary compounds is provided in (29):

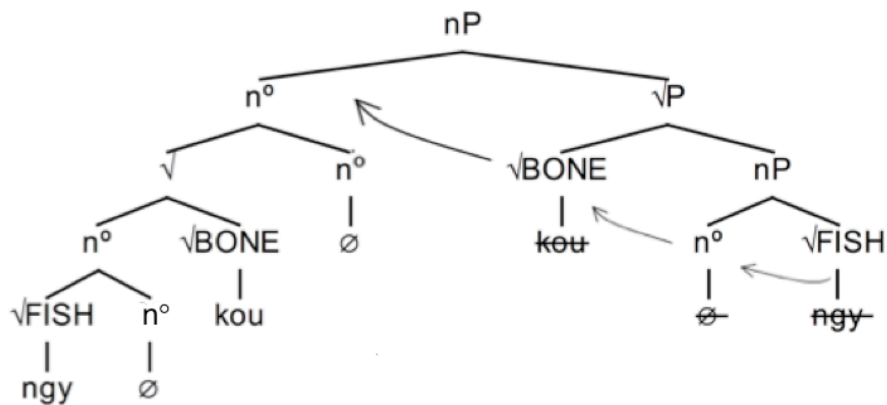
(29) The primary ('Root') compound *nurse shoes*, from Harley (2009)



As Harley claims, we start with the root $\sqrt{\text{NURSE}}$, which merges with the (here null) category-creating head n° and subsequently incorporates with it via head-movement. The resultant structure then merges and incorporates with the root $\sqrt{\text{SHOE}}$, and the same procedure is repeated once more when another nominalizing n° is merged. Vocabulary Insertion occurs as the structure is shipped to the phonological component of the grammar, and we end up with the compound noun *nurse shoe*. Harley's analyses for the other two compound types are identical in all the essential respects, the only difference being the flavors (n° , v° , a°) of the categorizing heads. Application of this approach to the Fuzhou data seems promising at first glance. Fuzhou "primary compounds", like the one in (30), can be straightforwardly subsumed under this approach.

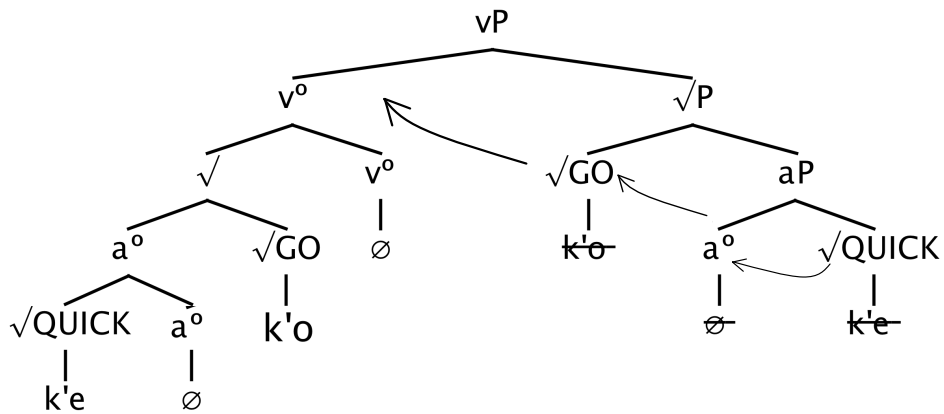
(30) a. *ngy = kou*
 'fish bone'

b.



The derivation proceeds as in (29). Here, Adv+V pairs seem like they too can be derived this way. (24a), for instance, could be analyzed as in (31), analogous to Harley's take on the English "modification-synthetic compound" *quick-acting*.

(31) Analysis for Fuzhou 'modification-synthetic compound' (=24a)



Compound vP structures of the likes of Fuzhou *k'e-k'o* (literally: 'quick-go') in (29) are presumably licit in English, but only as subcomponents of aPs, since one can say (32a) but not (32b).

- (32) a. tough-actin' Tinactin
 b. *Tinactin will tough-act

The unacceptability of (30b) actually requires Harley to stipulate that in English v° is subject to a morpho-phonological constraint that prevents it from hosting the incorporation of complex heads containing multiple roots. So the fact that Fuzhou equivalent of **tough-act* is grammatical successfully fulfills the prediction of Harley's theory without the need for any such stipulation, suggesting furthermore that some kind of language-specific parameterization of functional heads is at work.

I anticipate a theoretical objection to this Harley-style compounding analysis of Fuzhou Adv+V: The whole appeal of this particular approach, and of distributed morphology in general, is to be able to view the operations involved in word-building as fundamentally identical to those involved in XP syntax; but whereas English *toughing-acting* is coherently derivable through movement from *act tough*, and *odd-seeming* from *seem odd*, simple post-verbal adverbs of the sort in the sort in (33) are not found in Chinese.

- (33) a. *k'o k'e
 go quick
 'intended: to go quickly'
- b. *sieq tse
 eat together
 'intended: to eat together'

That being the case, though, I would point out that post-verbal adverbials, at least ones of a phrasal nature, are common enough, as in (13b), repeated below, or (34):

- (13) b. t'iu # ia eing
 'jump very high'

- (34) kong # k'a toai-leing
speak more big-voice
'speak louder'

Thus a derivation roughly along the lines of (29) for Fuzhou Adv+V pairs isn't entirely implausible. I therefore adopt it, and will show in section 3.2.1, in the discussion on the sandhi of nominals, how the same analysis carries over without a hitch to Adj+N pairs.

But Harley-style compounding and incorporation can only take us so far.

Incorrect predictions surface when the one tries to extend the same analysis to explain the sandhi on V+N, as I will show in the next section.

3.1.2 Verb + Bare-Noun Direct Object

Fuzhou, not unlike other dialects of Chinese, is replete with what shall henceforth be referred to as VO pairs, so as not to bias our investigation of their structure. Examples are provided in (35).

- (35) a. sieq = puong
eat food
'to eat (food)'
- b. me = tsy
buy book
'to buy books'
- c. luoq = in
record sound
'to record'
- d. k'ia = suong
reflect image
'to photograph'

As indicated, the verb and object in these pairs form a single sandhi domain. Some (35c,d) have become more lexicalized than others (35a,b) over time, as can be seen by the varied separability of verb and object:

- (36) a. sieq ni-kiang puong
eat a little food
'eat a little food'
- b. me nguai i tsy
buy I GEN book
'buy my book'
- c. *luoq suoq-re in
record one-CLS sound
(intended: 'record a sound')
- d. *k'ia nguai i suong
reflect I GEN image
(intended: 'take my picture')

The failure to separate V from O in (36c,d) suggests that the corresponding pairs in (35c,d) are indeed compounds. But could (35a,b) be compounds too, despite the apparent separability of verb and object? Chan (1998) claims that they are, but rightly concedes the difficulty of proving whether or not any given VO pair is a case of noun incorporation in a language with scarce overt morphology like Fuzhou. In a polysynthetic language like Southern Tiwa (of New Mexico), unique affixation patterns indicate whether the direct object appears separate from the verb (37a) or inside of it (37b):

- (37) Tiwa incorporation (from Baker 1988, cited by Chan 1998)
- a. **Seuan**-ide ti-mu-ban
man-SUF isS/AO-see-PAST
'I saw the man'
- b. Ti-**seuan**-mu-ban
isS/AO-**man**-see-PAST
'I saw the man'

Despite Fuzhou's impoverished morphology, evidence for the compoundhood of Fuzhou VO pairs can nevertheless be found indirectly by testing whether the pairs themselves can be part of larger compound nouns. As with the preverbal adverbs in (27), I take the absence of an overt connector *i* (= Mandarin *de*) to indicate that the juxtaposed elements form a single word, whereas the presence of *i* signals phrasal modification. Phrasal modifiers, as a general rule, do not enter into compounds. Hence, in (38), only the (a) example is grammatical:

- (38) a. tsia si yi ko-lema me i tsy
 this is he last-year buy MOD book
 'This is the book he bought last year'
- b. *tsia si yi ko-lema me tsy
 this is he last-year buy book

The contrast shown in (38) further suggests that the VO pairs comprising verbs plus bare nouns exhibit some degree of internal cohesion, since anything with more structure than that cannot itself be part of a larger compound. (40) shows that a similar effect holds true in English.

- (39)⁶ a. sie puluo (i) t'eing-huong
 eat grape MOD talent
 'a talent for eating grapes'

⁶ It is not entirely clear whether Chinese nominal compounds categorically disallow whole phrases, or whether they are licensed only under the correct pragmatic conditions (e.g. when evoking a "quotative" attitude). In the Mandarin example in (i), it appears that an entire verb phrase can form a compound with the noun *nengli* 'capacity':

- (i) [yikouqi he wan san ping jiu nengli] bing bu shi mei ren dou you de
 one.breath drink finish 3 bottles alcohol ability EMPH NEG be every person all have MOD
 'the capacity to drink 3 bottles of wine in one sitting isn't possessed by everyone'

Harley (2009) discusses analogous English examples like *stuff-blowing-up effects*, for which she offers a speculative explanation involving coindexing of separately built XPs with syntactic place holders on the main tree.

- b. sieq toai puluo *(i) t'eing-huong
 eat big grape MOD talent
 'a talent for eating big grapes'
- (40) a. a grape-eating talent
 b. ?? a big-grape eating talent

The null hypothesis, it would then seem, is that VO pairs are derived along the same lines as the 'primary compounds' and 'modification-synthetic compounds' from the previous section. However, such a proposal runs into serious problems. First is the issue of word order. An attempt to derive *me tsy* 'buy books' of (35b) as the sequential merging and incorporation of $\sqrt{\text{BOOK}}$, n° , $\sqrt{\text{BUY}}$, v° , incorrectly yields the incorrectly sequence **tsy-me* (literally: 'book-buy'). Second, in a Harley-style analysis, the verb only has one "first sister" with which it may incorporate, whether it's an internal argument as in *wheat-growing* or a modifier as in *quick-growing*). This predicts that no Adv+V+N sequence will form a tone sandhi domain, according to our assumption that tone sandhi domains correspond to word boundaries. The prediction does not match the facts; Fuzhou verbs can indeed form a tone sandhi domain with both a preceding adverb and a following object.

(41) Adv = V = N

- a. tsiu = sie = puong
 less eat food
 'eat less (food)'
- b. ts'uo-le ku = u = mi
 house-in still exist rice
 'There is still rice in the house'

(from Li (2000: 144))

Last on the list of objections to the incorporation-based analysis of VO pairs is an observation that turns out not to have received much attention at all in the syntactic literature. Namely, that apart from tone sandhi, there is a separate phenomenon of *initial* sandhi, generally involving some sort of lenition of the initial consonant of the second syllable when the preceding syllable ends in a vowel. And the grammatical conditions under which this sandhi occurs appear to be even more restrictive than those licensing tone sandhi. (Below is a brief list of how the affected consonants change.)

(42) Fuzhou Initial Sandhi patterns (based on Li (2000: 7))

/p-, p'-/	→	[β-]
/t'-, t'-, s-/	→	[l-]
/k-, k'-, h-/	→	[∅-] (zero initial)
/ts-, ts'-/	→	[ʒ-]

Initial sandhi is a regular feature of primary compounds and adverb-verb pairs (rendered here in full phonetic detail):

(43) /hui³³ ts'ia⁴⁴/ → [hui-ʒia 21-44]
 fire car fire-car (i.e., 'train')

(44) /kai³¹ sieq⁵/ → [kai-lieq 44-5]
 further eat further-eat (i.e., 'eat more')

But it is noticeably absent from VO pairs:

(45) a. /ta²³ ts'ia⁴⁴/ → [ta-ts'ia 44-44]
 ride car ride-car ('to ride a car')

b. /tso³¹ si³³/ → [tso-si 31-33]
 do dead do-dead ('to play dead')

It seems then that the presence of initial sandhi on a given string of syllables indicates a greater degree of "wordhood" than even tonal sandhi. Particularly suggestive are pairs of expressions such as the one in (46), where identical morphemes with identical tones give rise to different meanings as a function of whether or not the labial stop lenides:

- (46) a. ts'a44 βuong242 b. ts'a44 puong242
 fry rice fry rice
 'fried rice' 'to fry rice'

With these facts in mind, I propose that VO pairs like *ts'a puong* 'fry rice' are the result of morphological merger between the verb and noun. While compounding is a syntactic operation (at least in the DM framework, where the notion of *lexicon* has been dispensed with), morphological merger is post-syntactic operation, affecting a structure as it is shipped to PF. The particular type of morphological merger that I assume affects these VO pairs is what's referred to by Embick and Noyer (1999) as *local dislocation* (which is to be distinguished from *lowering* by the fact that it occurs at the point of, rather than before, vocabulary insertion (VI)). Their schematization of the kind of structural rebracketing that the operation imposes is provided in (47), where the asterisk is used to indicate linear precedence.

(47) Location Dislocation (A type of Morphological Merger)

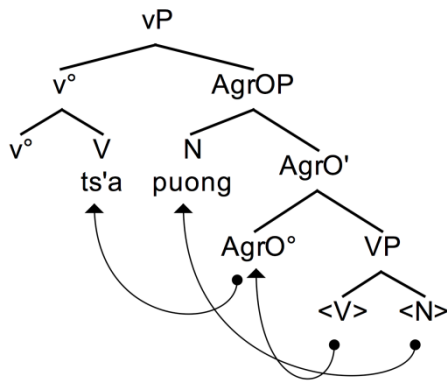
$$[_{XP} X [_{YP} [_{ZP} Z] Y]] \rightarrow [X * [Z * Y]] \rightarrow [[_{X^\circ} X+Z] * Y]$$

The first stage shown in (47) is the output of syntax. In this stage, explain Embick and Noyer (1999: 16), "X takes YP = [ZP Y] as its complement, where ZP is either a complement to Y or an adjunct to YP". In the intermediate stage, the elements are linearized, which allows Z to enter into a relationship of adjunction with X in the final

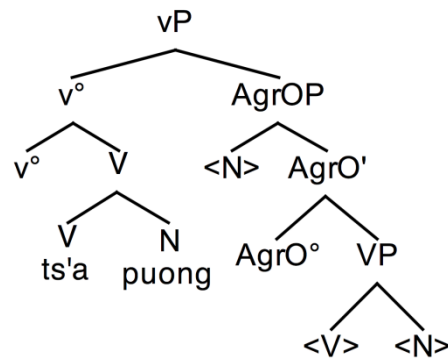
stage⁷.

Concretely, for *ts'a puong* 'fry rice', I propose the derivation in (48). Though it's not shown explicitly in (48), I still maintain the assumption that that V and N are not primitives, but derived syntactically through the merging of Roots with category creating heads. The verb *ts'a* 'fry' raises to v through head movement and *puong* rice raises to the specifier of AgrO in for case checking. Local dislocation then applies, yielding the result to the right.

(48) a. Syntactic Operations



b. Morphological Merger



The lack of a sisterhood relationship between *puong* 'rice' and *ts'a* 'fry' at the output of syntax accounts for the marked absence of lenition effects in this type of construction, while the presence of tone sandhi on such constructions attests to the fact that the phonology sees them as words. Items like (40a) that are products of compounding, by contrast, aren't just merely words, they're really most sincerely words.

Now that the presence of tone sandhi and absence of sandhi on the VO pair *tso t'ie* 'to make (or produce) iron' can be accounted for, a morphosyntactic explanation easily

⁷ (47) demonstrates what's known as "string-vacuous" or "non-inverting" local dislocation, since X and Z do not switch places. Though not attested in the Fuzhou data, Local dislocation allows by design for that kind of switching, thus permitting it to account for curious surface orders, e.g., Latin *-que* conjunction (see Noyer and Embick (1999: 16)).

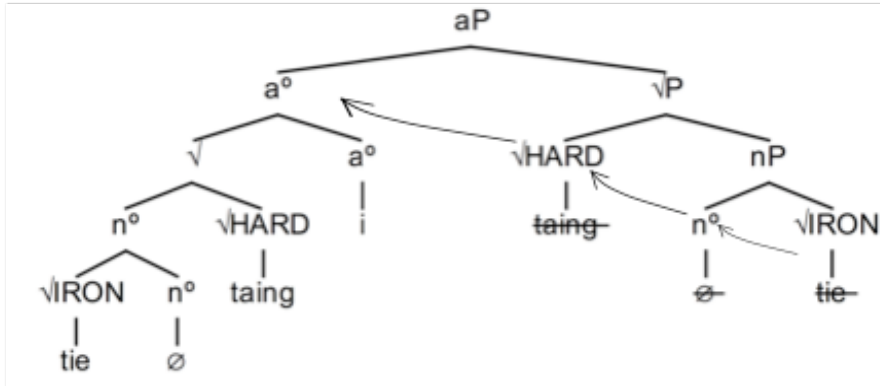
suggests itself for the asymmetry in (7), repeated below, which Hung touts as evidence for the Argument/Adjunct approach (since 'iron' undergoes sandhi when it serves as a adjunct to 'hard' but not when it serves as an argument for 'made').

- (7) a. t'ie taing i
 23>44 242 0
 iron hard MOD
 'iron-hard'
- b. t'ieq tso i
 23 # 213 0
 *23>44 213 0
 iron make MOD
 'iron-made'

(from Hung 1987; 1992:66)

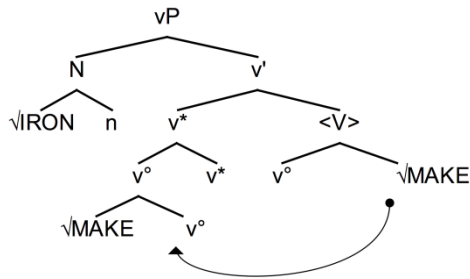
The derivation in (7a), shown in (49), proceeds along the same lines as that of *k'e-k'o* 'to go quickly' in (31): We start with the root $\sqrt{\text{IRON}}$, which merges with the null category-creating head n° and subsequently incorporates with it via head-movement. The resultant structure then merges and incorporates with the root $\sqrt{\text{HARD}}$, and the same procedure is repeated once more when the adjectivalizing a° (to be realized phonetically as *i*) is merged. Vocabulary Insertion occurs as the structure is shipped to PF, yielding the aP *t'ie-taing-i* 'iron hard', with sandhi present on *t'ie* 'iron' because of its having been merged with *taing* 'hard' as a root.

(49)

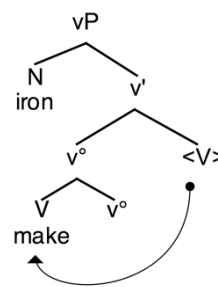


The derivation of (7b), shown in (50), takes a different course. Here root $\sqrt{\text{IRON}}$ and $\sqrt{\text{MAKE}}$ are both merged with categorizing heads (n° and v° , respectively), and nP is subsequently merged into the specifier of v, whence its external argument interpretation. In this arrangement, there is no way for morphological merger to apply, since the left-peripheral element, the noun *tieq* 'iron', is not a syntactic head.

(50) a. 'iron-made' (in DM detail)



b. 'iron-made' (without DM detail)



Apart from shedding insight on syntactic underpinnings of Hung's generalization, the morphological merger hypothesis also correctly predicts that sandhi will only show up on verbs that are followed by bare nouns, and not ones followed by nominals with a larger, more articulated structure, as the next section will show.

3.1.4 Verb + DP/NumP

In contrast to the verb + bare noun combination discussed in the previous subsection, Fuzhou verbs followed by definite or quantified objects regularly fail to show tone sandhi. This is expected, given that such objects are standardly assumed to be phrasal in nature. As such, they are precluded from participating in string-vacuous local dislocation with the adjacent verb head, and hence both verb and object form separate sandhi domains, as exemplified in (51).

- | | | | | |
|------|----|-------------------------|---|---------------------|
| (51) | a. | sieq # tsi zieq # po-lo | / | me # tsi uong # tsy |
| | | eat this CL grape | | buy this CL book |
| | | 'eat this grape' | | 'buy this book' |
| | b. | seiq # suo zieq # po-lo | / | me # suo uong # tsy |
| | | eat one CL grape | | buy one CL book |
| | | 'eat one grape' | | 'buy one book' |
| | c. | sieq # tuai po-lo | / | me # ku tsy |
| | | 'eat big grapes' | | 'buy old books' |

In the examples examined so far, overt determiners and numerals have been present, which leaves open the possibility that the presence of tone sandhi on the selecting verbs is merely a consequence of prosodic factors, rather than of underlying structure. This is unlikely, however, since even DPs with no overt determiners, such as the proper noun *Yima* 'Mom' in (52), will block sandhi on the preceding verb.

- (52) bu-no # eu-o # ko # Yima
 stomach hungry-ASP call Mom
 'If you get hungry, call Mom'

In this case, it is likely that a phonetically null determiner carrying features like [+def] intervenes, with the consequence that the verb *ko* 'call' and the root *Yima* 'Mom' are blocked from participating in any kind of morphological merger⁸.

More will be said on the internal structure of Fuzhou nominals in Section 3.2.2. In the next subsection, we'll look at the case of locative and other non-theme post-verbal objects in Fuzhou, and see to what extent the surrounding sandhi effects can be attributed to phrasehood here as well.

3.1.4 Verb + Non-Logical Object

One quirk of Fuzhou tone sandhi for which no theory so far has yet provided an adequate explanation is the observation that non-logical objects - mainly locatives and time expressions - do not license tone sandhi on the selecting verb, as opposed to themes (or at least bare-noun themes) which do. Let us start with locatives. Li (2002: 146) notes an interesting asymmetry between what he calls "lexicalized" and "non-lexicalized" verb phrases. Key data are provided below in (53-55). The verbs in the (a) examples all exhibit tone sandhi, while the verbs in the (b) examples all are read in their citation tones.

(53)

a. soey = ts'ia
sit car
'to travel by car'

b. soey # ts'ia le
sit car in
'to sit in a car'

(54)

a. tsy = ien
live hospital

b. tsy # i -ien le
live medical hospital in

⁸ Languages like Catalan, where proper nouns are accompanied by overt definite articles, provide evidence for the presence of null counterparts other languages like English and Chinese:

(i) la Nuria ha comprat un gat
the Nuria has bought a cat
'Nuria bought a cat'

- | | | | |
|------|---|----|---|
| | 'to be hospitalized' | | 'to live on the hospital grounds' |
| (55) | | | |
| a. | tuon = ts'uo
return home
'to return home' | b. | k'oe # ts'uo le
forget home in
'to forget (sth.) at home' |

While the objects in the (a) examples semantically denote locations or goals, the presence of tone sandhi on the verb (and *lack* of initial sandhi on the objects), in conjunction with the expressions' tendency toward idiomatized meaning, suggests that they should be ascribed the same analysis as canonical VO pairs, that is, that *ts'ia* 'car' of (53a) undergoes local dislocation to adjoin with *soey* 'sit' (see section 3.1.2). On the other hand, the locative and directional objects in the (b) examples, where the localizer *le* is present, correlate with no tone sandhi on the verb, and generally tend to give rise to more literal meanings. Li (2008) presumes that the added syllable may be to blame, making the object too prosodically heavy to form a unit with the verb. This is unlikely, however, since we've already seen that disyllabic objects will readily form sandhi domains with their selecting verbs, as in (14), repeated below:

- (14) sie = ke-luong
eat chicken-eggs
'to eat eggs'

The extra syllable in the (b) examples is unlikely, then, to be the deciding factor.

There is in fact a simple syntactic explanation. The failure of the locatives in the (b) examples in (41-43) to cause sandhi follows straightforwardly from the assumption that these, unlike their (a) counterparts, are DPs. Huang et al. (2009), for one, provides evidence that in expressions like these, where localizers such as Fuzhou *-le* 'at' (or

Mandarin *-li* 'at', *-shang* 'on', *-xia* 'under') appear post-nominally, are in fact a subtype of DP, dubbed LocP. One piece of evidence they cite in support of the hypothesis that localizers are nominal in nature as opposed to being postpositions is the fact that expressions that contain them cannot serve to locate an action without the help of an additional preposition, like *tio* 'at'. The following Fuzhou example below, based on Huang et al.'s (2009: 11), demonstrates this point:

- (56) yi *(tio) ts'uo-le sie puong
 he at home-in eats food
 'He is eating at home'

If this assessment is correct, then we expect LocPs to incur the same sandhi effects as place names. They do, in fact, as demonstrated by the lack of sandhi on the verb in (57).

- (57) nguai # tsy # Hok-tsu
 I live # Fuzhou
 'I live in Fuzhou'

This same analysis now immediately captures the fact that Fuzhou Verb+Frequentative pairs, like (58), which Hung (1987) classes as a case of "post-head modifier", fail to form a tone sandhi domain, as phrases of frequency (or duration) are by definition always quantified, and therefore unamenable to morphological merger due to their phrasal nature:

- (58) p'a # neng ui
 hit two times
 'hit twice'

3.1.5 Verb with Resultative Complements

A survey of tone sandhi in the Fuzhou VP would not be complete without a discussion of resultative verb constructions. As a term, *resultative verb construction* (or RVC) refers to any sequence of two verbal elements where the second element serves to signal the result of the action or process conveyed by the first. Such constructions are a common feature of Chinese dialects. Interestingly, the two verbs of a Fuzhou RVC never form a tone sandhi domain: sandhi on the first verb is always blocked, as shown in (59) below.

(59) Blocked sandhi in resultative verb compounds

- a. seiq # uong
 eat finish
 'to eat (all) up'

- b. t'iang # kui
 push open
 'to push open'

- c. tsy # mou
 cook soft
 'to cook (sth.) soft'

- d. p'ai # p'uai
 hit break
 'to hit and break'

Much discussion has been generated in trying to explain the underlying structure of Chinese RVCs, which in many ways resemble clearly biclausal V-de constructions, as demonstrated in the parallel between the Mandarin examples in (60) and (61).

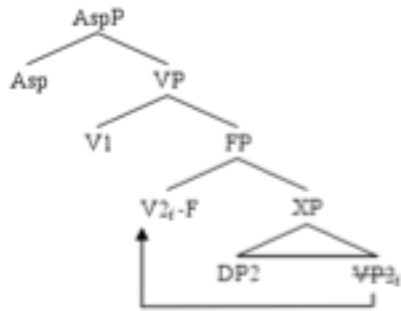
- (60) *Resultative Verb Construction*
Zhangsan ku-shi le shoujuan.
Zhangsan cry-wet LE handkerchief
'Zhangsan cried the handkerchief wet.'

- (61) *V-de (bi-clausal) Construction*
Zhangsan ku de shoujuan shi le
Zhangsan cry DE handkerchief wet LE
'Zhangsan cried such that the handkerchief got wet'

Some scholars argue for a syntactic derivation of RVCs (Wu 2005, Sybesma 1999, Shibata et al. 2004), while others argue that they are simply lexical compounds and that what you see is more or less what you get (Li Y.-F. 2001). While a recap of the debate is beyond the scope of this present paper, it is worth noting that the Fuzhou data in (59), under the present assumptions about the structural constraints on tone sandhi, support a syntactic-based approach to resultatives. Shibata et al.'s (2004) analysis, given in (62), seems particularly appealing. It posits that constructions analogous to (61) and (62) both originate in a biclausal structure: whereas in (61) the extent-denoting morpheme *de* fills a functional head located at a spot in-between the two verbs, in (62) that same head is null, thus allowing the lower verb to raise and incorporate into it, with the result that their linear proximity is not compounding, but coincidence. Post-syntactic morphological merger is also ruled out in this case as that would mean that V2, now a constituent of a morphological word in its new position, would have to have excorporated, which morphological merger does not allow for⁹.

⁹ As Embick and Noyer (1999: 19) word it: "A subword, i.e. a terminal node within a complex X° created by Raising or through the insertion of dissociated morphemes in Morphology, can never adjoin to an element outside of that X."

(62) Shibata et al.'s (2004) verb raising analysis for resultatives



In addition to explaining the synchronic alternation between extent-denoting constructions with *de* and resultatives, such an analysis also has the advantage of mirroring the historical change that took place in Chinese over the past thousand years: objects used to appear between V1 and V2 in resultative-like constructions, before the current word order of V1 > V2 > Object came to prominence, as seen in the following example from the Tang era:

(63) Zuo ci yu liao, suiii nan xing
 make this talk finish, then south go
 After he said this, he set out to the south (*Dunhuang Bianwen Ji* : 8)

Thus, the historical word order of the resultative verb constructions is still attested in the "deep structure" of the Modern dialects.

3.2 Sandhi in the NP

3.2.1 Presence of sandhi between Adj and N

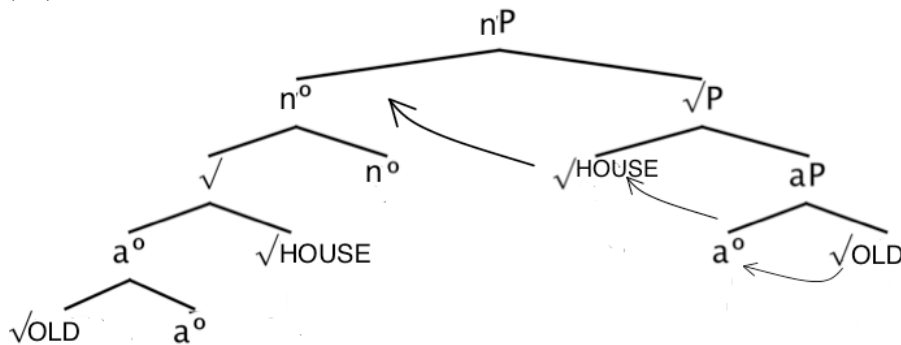
As observed by Hung (1987), tone sandhi regularly occurs between Adjective-Noun pairs. Examples include the following (from Li, 2002):

(64) Adj = N

- a. k'ou = ts'uo
old house
'old house'
- b. uong = hua
yellow flower
'yellow flowers'
- c. tuai = kung-si
big company
'big company'
- d. siu = tsui -k'ou
small water reservoir
'small reservoir'

This pre-nominal adjective sandhi can be explained along the same lines as the preverbal adverb sandhi in *k'e-k'o* 'to quick-walk', that is, as a case of primary compounding. Thus, the example in (64a) is derived as in (65).

(65)



This is in contrast to phrasal examples such as those in (66), where no such compounding has taken place, and consequently no sandhi is observed on the first syllable:

- (66) a. k'ou # i ts'uo
old MOD house
'old house'

- b. uong # i hua
yellow MOD flower
'yellow flowers'

That separate structures are at play in (64) and (66) is supported by evidence from reduplication and *ia*-intensification, analogous to (27-28) cited during the discussion on adverbs. The constructions in (67) do not allow for them:

- (67) a. *k'ou k'ou ts'ou
old old house
- b. *ia k'ou ts'ou
very old house

But the constructions in (68) do:

- (68) a. k'ou k'ou # i ts'uo
old old MOD house
'(a) real old house'
- b. ia k'e # i k'o
very old MOD house
'(a) very old house'

It must be admitted that sandhi on a syllable like *k'ou* 'old' of (61a) is in fact already ruled out for prosodic reasons: since the modification marker *i* is toneless, there is nothing for the [242] citation tone of *k'ou* 'old' to either assimilate to or dissimilate from in the first place. Chan (1998: 169) seems to have skirted around this fact, instead attributing the lack of sandhi in cases like (68a) to the assumption that "the adjective is non-lexically governed by the modification number, and not lexically governed by the noun". Under

such scrutiny, it seems all the more likely that the cause of the asymmetry is simply that (64a-d) are compound words and (66a,b) aren't.

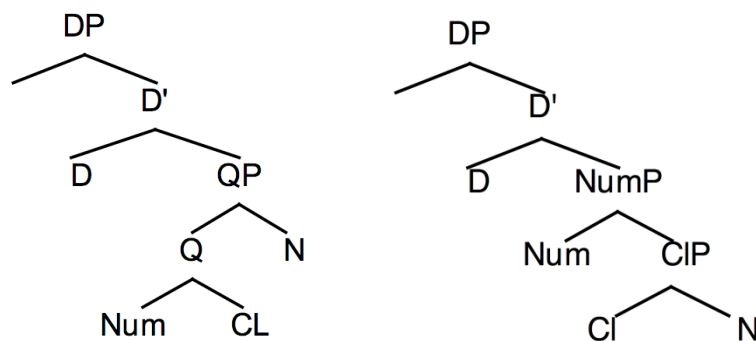
3.2.2 Num and CL - Sandhi; CL and N - None

The final Fuzhou tone sandhi phenomenon to be addressed involves the presence or absence of sandhi within the expanded DP domain. Specifically, sandhi occurs always between a numeral and a classifier, and never between a classifier and a noun, as shown below:

(69) suo = uong # tsy
 one CL book
 'one book'

This fact led Chan (1998) to advocate for the DP structure in (70a) where Num and CL form a morpho-syntactic unit, as opposed to Num and CL each head right-branching functional projections, as in (70b).

(70) a. Fuzhou DP, a la Chan (1998) b. Standard expanded DP



The sandhi facts aside, an analysis along the lens of (66a) is not without evidence. For one, within a Chinese DP, Num and CL are generally inseparable. Whereas an adjectival modifier such as *hou hou de* 'thick' can be inserted between the demonstrative

and the numeral or between the numeral and the noun, it cannot come between Num and CL, as has been claimed by Yang (2001), who provides the following data from Mandarin:

- (71) a. na wu -ben [houhou -de] shu
that five-CL thick-DE book
'the five books, which are thick'
- b. na [houhou-de] wu-ben shu₂₅
that thick-DE five-CL book
'the five thick books'
- c. *na wu [houhou-de] -ben shu
that five thick-DE -CL book

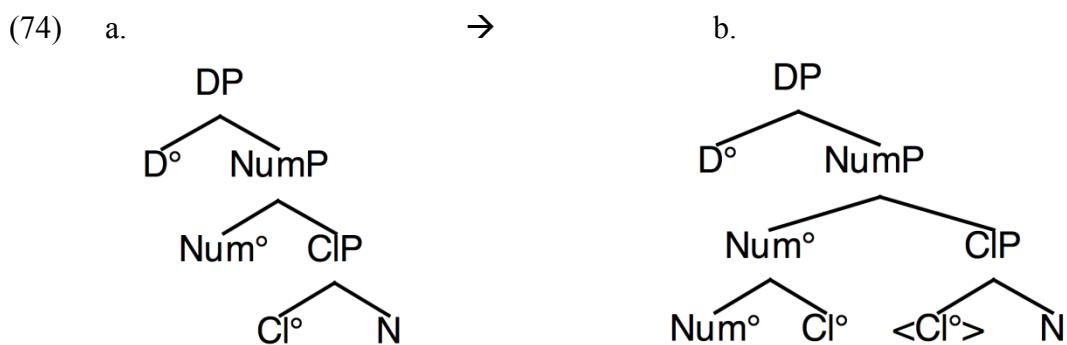
Second, omission of either the numeral or the classifier generally leads to unacceptability, as shown with the Fuzhou data in (72). This suggests that the two elements are interdependent, as would be the case if they formed a single syntactic unit or word:

- (72) a. suo uong tsy in kao
one CL book NEG suffice
'one book is not enough'
- b. *suo tsy in kao
one book NEG suffice
- c. *uong tsy in kao
CL book NEG suffice

Problematic counterexamples arise, however, in the form of (73), where a monosyllabic adjective like *xiao* 'small' *can*, in fact, intervene between Num and CL.

- (73) suo siu puong tsy
 one small CL book
 'one small book'

Furthermore, under the assumptions of distributed morphology, there is no more lexicon through which to generate the purported Num-CL complex. To explain the fact that the two syllables nevertheless behave phonologically as a word, I analyze (69) as a case of string-vacuous local dislocation, where (74b) is derived from (74a) post-syntactically:



This then begs the question of why nouns are not also part of this sandhi domain, as nothing so far seems to be preventing it. The answer, I believe, is related to the lexical functional distinction. In all the data surveyed so far, it seems that a precondition for word-formation in Fuzhou (whether through compounding or morphological merger) is that the two candidate syllables match one another in being either functional or lexical. This generalization is formulated in (75).

- (75) Lexical-Functional Matching Condition (aka Opposites Repel)
 Two morphemes must be either both functional or both lexical to form a word with one another in Fuzhou.

Though not formulated in precisely the same terms, this principle seems very similar to the following requirement from Embick and Noyer (1999: 18 (their (41))):

- (76) If a Merger operation exchanges an adjacency relation between two elements *A* and *B* for an adjunction relation, then *A* and the head of *B* are either both MWds or both Subwords.

This condition additionally explains the presence of sandhi between two verbs in sequence as in:

- (77) ko = me = tsy
go buy book
'go buy books'

It also sheds light on the murky cases of sandhi optionality between certain categories of words, as discussed in the next section.

4. Explaining sandhi optionality

In certain grammatical contexts Fuzhou tone sandhi appears to occur only optionally. In this section we'll consider two such cases, to see whether their behavior can be reconciled with the current analysis of tone sandhi and its syntactic constraints.

4.1 Sandhi optionality between prepositions and nouns

Hung (1987) points out the problematic nature of prepositions, insofar as it seems to be optional whether they form a tone sandhi domain with the object they select. In his examples, shown here in (78-79), the prepositions *tiu* 'toward' and *pi* 'than' may or may not change to their sandhi tone, as indicated by the equals sign within parentheses.

- (78) yi # tiu (=) se # kiang
he toward west walk
'He walks towards the west'

- (79) ny # pi (=) p'ui # kui # suo-pui
 meat than vegetable expensive double
 Meat is twice as expensive as vegetables.

While an embarrassment to Hung's generalization, these facts about Fuzhou prepositions are not unexpected given the Lexical-Functional Matching Condition of (71).

Crosslinguistically, prepositions tend to straddle the line between lexical and functional category, sometimes carrying substantive meaning related to location or direction, other times appearing more like markers of inherent case. Huang et al. (2009) designate Chinese prepositions as a lexical category, but one whose featural specification is [-V, -N]. (Verbs are [+V, -N], Nouns are [-V,+N] and Adjectives are [+V,+N]). Chinese prepositions, they explain, are non-nominal in that they are able to take an object without the help of any intermediary material (such as *dui* 'to'), and they are non-verbal in that they cannot function by themselves as predicates. In these key respects, they more or less resemble English prepositions. Having a completely negative specification along these two parameters of lexical categories, it is not surprising that morphological merger with a bare noun complement nominal object is neither strictly excluded nor strictly required.

4.2 Sandhi optionality between verbs and pronouns

In Fuzhou, when personal pronoun such as *nguai* 'I' or *yi* 'he/she/it' follows a verb, the verb may either change to its sandhi tone or remain in its citation tone, as indicated with the parentheses in (80-81):

- (80) Yitie p'ai (=) n'guai
 Dad hit me
 'Dad hit me'

- (81) Mo ma (=) yi
 Don't look him

'Don't look at him'

Meanwhile, sandhi appears to categorically be blocked on verbs preceding indexical pronouns, such as *tsui* 'this':

- (82) ny k'ang *(#) tsui
you look this
'Look at this!'

An analogous phenomenon was explored by Lin (1995) for Taiwanese. He noticed that pronouns in that dialect sometimes occurred in their full tone, thus triggering sandhi on the preceding syllable, and sometimes were phonetically reduced, and thus not triggering any such sandhi.¹⁰

- (83) *Taiwanese*
Goa lai koaN (=) yi
I come see him
'I've come to see him'

Lin hypothesizes that the underlying reason is the Taiwanese pronouns are sometimes DPs and sometimes clitics. The fact that sandhi is always blocked when the pronoun is the locus of contrastive focus supports this hypothesis.

Returning to Fuzhou, where the claim is that the ability to trigger tone sandhi is a consequence of root-level merge between the two elements, we could explore the possibility that two structures are in alternation: one where the pronoun is a clitic and merges with the selecting verb, and the other where it is a DP and cannot.

¹⁰ Lin (1995) observes that the same phonetic reduction will happen to Taiwanese subject pronouns as well, though that effect, interestingly, has no parallels in Fuzhou, where subject pronouns always form an independent sandhi domain.

A similar phenomenon is seen with pronouns in Romance, where it has been claimed that a three-way distinction holds between direct-object "clitics", "weak pronouns" and "strong pronouns" (Cardinaletti and Stark (1999), Roberts (2010)). Incorporability, as observed through moveability, is the distinguishing empirical characteristic between the three, with clitics always incorporating with their verbal hosts and therefore able to move with them, strong pronouns never doing so, and weak pronouns only sometimes. Roberts (2010) argues that this is because clitics are like DPs stripped of all their functional projections, and left only with ϕ -features. He therefore refers to them as ϕ Ps (or $\phi^{\text{min/max}}$): "Clitics," argues Roberts, "and perhaps some other deficient pronouns, can be thought of as lexical categories lacking the internal, lexical nP phase" (p.56). This is aimed at explaining, among other things, the French facts in (84):

- (84) a. Jean voit Marie
 Jean sees Marie
 'Jean sees Marie'
- b. Jean la voit
 Jean her sees
 'Jean sees her'
- c. *Jean Marie-voit
- d. *Jean voit la

Assuming that Fuzhou pronouns - like the *nguai* 'me' of (80) - if and when they succeed at triggering tone sandhi on their selecting verbs, are likewise "deficient", then the mechanism behind it is really the same as that at work in the VO pairs of section 3.1.2. Seeing the pronoun as a minimal category, the post-syntactic

operations it essentially as they would a bare noun, and therefore morphological merger, and the resultant sandhi, is entirely expected.¹¹

5. Conclusion

Fuzhou is a language whose tonal phonology is remarkably sensitive to syntax. I have shown that a diverse range of sandhi facts can be captured under the hypothesis that successful sandhi is the phonological byproduct of two elements having been joined into a single morphological word, through the process of either compounding or local dislocation. This explains the *presence* of sandhi between manner adverbs and verbs, verbs and bare nouns, adjectives and nouns, as well as between any two elements of a canonical compound. Likewise, it explains the *absence* of sandhi between subjects and verbs, sentential adverbs and verbs, as well as between verbs and a wide range of complex objects. What's more, this analysis of the sandhi facts suggests that there is an additional constraint on the morphosyntactic processes that feed sandhi, namely the *Opposites Repel Condition*, requiring that two elements must be either both functional or both lexical in order to form morphological word, which attests to the longevity of the lexical-functional distinction regardless of how many times or how thoroughly the framework is made-over.

¹¹ Whether an information structure-based analysis could account equally well for the same set of post-verbal nominal sandhi effects is an interesting question for future research.

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