Cov and Underspecified Nouns:

A Syntactic and Semantic Analysis of Hmong Classifiers

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Abstract

Hmong nominal classifiers are quite complex. One clear rule however is that double classifiers are not allowed. Surprisingly, then, there is a double classifier construction involving the classifier *cov* and underspecified nouns that appears to break these rules. The goal of this thesis is to resolve this problem, syntactically and semantically modeling Hmong classifiers along the way. After giving background on the literature on Hmong classifiers, I develop a syntactic model for Hmong classifiers based on the Minimalist Program and Distributed Morphology, and use Link's semantic model of plurality to make sure the syntactic model works out semantically. Then I use this model to explain this double classifier construction. In particular, the classifier of the underspecified noun, and mass nouns more generally, is just a *n* head, meaning there is room for another classifier. Finally, I conclude with some comments on implications this theory has and potential avenues for future research.

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Contents

1 Introduction

A common theme regarding nouns cross-linguistically is dividing them into various classes. Some languages, like German or Arabic, divide nouns into various genders, often requiring other words in the sentence to agree with the nouns' genders. Other languages, like Japanese or some Mayan languages like Ch'ol, use nominal classifiers, extra words required to count nouns that vary based on the nouns class. Hmong is one such language that uses nominal classifiers. However, Hmong's nominal classifier system is quite unique and complex. With it comes some interesting phenomena. For example, there is an unexplained double classifier construction where the classifier *cov* can be used in addition to the nominal classifier associated with a noun, but only in certain circumstances.

This thesis explores the syntax and semantics of Hmong classifiers before ultimately concluding that the classifier in this instance is actually a *n* head[1], and then using this framework to generalize this argument, utilizing new data along the way.

Section 2 gives a background on Hmong and classifier systems more broadly, particularly focusing on the literature surrounding Hmong classifiers, and uses this background to introduce the main puzzle of this thesis. Section 3 outlines the syntactic and semantic framework this thesis will use in analyzing this double classifier phenomenon, particularly giving a thorough syntactic and semantic description of Hmong DPs as they relate to classifiers. Section 4 explores various possible analyses of the data, including two previous analyses in the literature, before coming up with a working analysis. Section 5 brings up some new data that appears to contradict this working analysis, but resolving this problem leads to a much more general argument. Finally, section 6 concludes the thesis and gives various predictions that this theory makes, as well as potential avenues for future research.

1.1 Data

Most of the example sentences in this thesis come from either myself or my consultant. The sentences I created were all double checked with (and potentially corrected by) my consultant to make sure they were all as correct and natural as possible. All translations, including translations of sentences from other papers, were double checked or given by my consultant as well. Sentences not from myself or my consultant are cited.

2 Background on Hmong and *Cov*

2.1 Hmong Background

Hmong is a language with about 2 million speakers spoken in Southwestern China, Laos, Vietnam, Northern Thailand, as well as a significant diaspora in the United States, Australia, France, as well as other places. Hmong has two largely mutually intelligible dialects, namely Hmong Daw and Mong Leng, but they differ significantly enough that they are often studied separately (Ethnologue 2022).

My consultant is a native speaker of Mong Leng, but also speaks Hmong Daw fluently. The examples in this thesis are given in Hmong Daw, as Hmong Daw is more

[1]Read "a little n" head, as opposed to an N head, which is just read "an N" head.

widely studied and spoken. So far I haven't observed any major syntactic differences, at least with respect to classifiers, between Hmong Daw and Mong Leng. That being said, it is important to keep in mind that my consultant is a native Mong Leng speaker, meaning his judgments may potentially differ from native Hmong Daw speakers, though I find this unlikely. Additionally, Hmong is a rapidly evolving language, so it is also important to mention that my consultant is young, meaning his intuitions and speech likely differ, potentially quite substantially, from those of older speakers. For convenience's sake, I will refer to the language simply as Hmong since everything I will say besides specific words or pronunciations will apply to both major dialects.

Hmong is a member of the Hmong-Mien language family, whose status among other language families of Southeast Asia is highly contested. Scholars argue that Hmong-Mien languages are alternatively Sino-Tibetan, Tai-Kadai, Mon-Khmer, Austronesian, or simply an isolate (Ratliff 2010). While it seems not unreasonable that Hmong-Mien is related to some nearby language family, the extensive history of contact among Southeast Asian languages and long time-frame make it nearly impossible to tell precisely. As for Hmong itself, it is a West Hmongic (alternatively called Chuanqiandian) language of the Hmongic branch of the Hmong-Mien family, though determining the internal structure of the Hmong-Mien language family can be quite a challenge (Ethnologue 2022, Ratliff 2010).

Typologically, Hmong has a lot of features in common with other Southeastern Asian languages (Marybeth (Ed.) 2015). In particular, Hmong is isolating, with primarily uninflected and monosyllabic words that can be very productively compounded to form more complex words (though this process is more complicated than might appear at first glance; see Riddle (1994) for more details). Syntactically, Hmong sentences are typically Subject-Verb-Object. Modifiers proceed words that they modify, with the exception of adjectives, which are analyzed as stative verbs in a relative clause.

Quick Note on Written Hmong

Hmong is primarily written using the Romanized Popular Alphabet (RPA), an alphabet created by a group of Christian missionaries in Laos in the 1950's, though other writing systems exist (Smalley 1990). RPA is an extremely convenient writing system, for Hmong speakers and linguists alike, though it can be rather unintuitive for people not familiar with it. Hmong syllables very nearly always have a strict CV structure. Thus Hmong words are written with a letter or sequence of letters indicating the initial consonant, a letter or two for the vowel, and a letter for the tone. Since no native Hmong words end in consonants, consonant letters can be reused to indicate tone, as shown in Table 1 below[2].

Additionally, tones undergo a phonological process called tone sandhi, where neighboring tones influence each other. In Hmong, tone sandhi is no longer productive, but still frequently occurs between numerals and classifiers, which will happen a lot in this thesis. The most common tone sandhi, in this thesis at least, is that if a numeral ends in a *-b* tone and the following classifier ends in an *-s* tone, then that *-s* tone becomes a *-g* tone. For instance, *ib tus* 'one CLF(anim)' becomes *ib tug*. In short, some *-s* tones may change into *-g* tones in examples. It should be clear, however, from the gloss that

[2]A fun tongue twister using most of the tones I learned from my father, a non-native Hmong speaker, is *kuv pom pog nrog Pos pov pob*. It means 'I saw grandma throwing a ball to Pos,' where *Pos* is a typical Hmong name.

Letter	Tone description
-b	high
-j	falling
-∅	neutral
-v	rising
-s	low
-m	low with glottal stop/creaky
-d	low rising (variant of -m)
-g	low falling breathy

Table 1: Tone Letters in Hmong

the word is the same. Another relevant instance of tone sandhi is that the classifier *cov* becomes *co* when preceded by a *-b* tone.

Another potentially unintuitive thing about vowels is that doubled vowel letters indicate nasalization, which is most often realized as -ŋ. As such, for example, the word *Hmong* in Hmong Daw is pronounced /m̥ɔ̃ŋ/, and so is spelled <hmoob>.

The base consonants and vowels are close to their IPA counterparts, and relatively intuitive for people familiar with the IPA. The letters that differ from the IPA are shown in Table 2 below.

Letter	IPA
w	ɨ
r	ɽ
x	s
s	ʂ
y	j
xy	ɕ
z	ʑ
ny	ɲ

Table 2: More Letters in Hmong

More complex consonants and diphthongs are written in intuitive ways. For instance, following a consonant with <h> indicates aspiration, preceding it with <n> indicates prenasalization, etc. Diphthongs are written simply by placing the vowels next to each other.

2.2 Classifier Basics

Noun classifiers, like grammatical gender or noun classes, are a linguistic tool for distinguishing classes of nouns. Every noun in Hmong has an associated classifier. Some examples are shown below in (1). For instance, cats are alive, so they use the classifier *tus*, used for animate things as well as long thin things, as shown in (1a). Fields are flat, so they get the classifier *daim*, used for flat things, as shown in (1b), etc. The classifier *lub*, shown in (1d), is used for round bulky things, but it is also somewhat of a default classifier, so it gets used for abstract concepts as well.

(1) a. ib tug miv
one CLF(anim) cat
a cat
b. ib daim teb
one CLF(flat) field
a field
c. ib raab rag
one CLF(tool) knife
a knife
d. ib lub tsev
one CLF(bulky) house
a house

Classifiers are also very closely associated with specificity and definiteness. For instance, classifiers are not always required. However, when a classifier isn't present, the meaning of the noun ends up much more general, as shown in (2). On the other hand, adding a classifier makes the referent specific, as shown in (3) and (4). The difference between (3) and (4) is definiteness, which I will explain in greater detail later.

(2) Miv loj.
Cat big.
Cats are big (in general).

(3) Tus miv loj.
CLF(anim) cat big.
The cat is big.

(4) Ib tug miv loj.
one CLF(anim) cat big.
A cat is big.

The relationship between classifiers and definiteness and referential specificity, particularly in a discourse context, is a very interesting and complex topic, both in general and specifically with respect to Hmong, with Riddle (1989) being a fantastic overview of the subject. As a rule of thumb, however, if a specific referent is intended and not abundantly clear from context, a classifier will be used. So, for instance, classifiers are used when dealing with possession, since a specific referent is typically entailed by possession, as we can see in (5).

(5) Kuv tus miv loj
I CLF(anim) cat big
My cat is big.

Hmong has several different types of classifiers, as well as other words that play similar roles. Fortunately, Bisang descriptively modeled these kinds of words.

2.3 Bisang's Model of Hmong Classifiers

Walter Bisang describes various kinds of classifiers and related words with "a general framework for the functional range of classifiers in a given language" in Bisang

(1993) that will be useful going forward. In particular, Bisang outlines three roles that classifiers can play, though I will only be discussing two, namely *individualization* and *classification*. Individualization is the process by which nouns end up referring to a specific entity. Classification, on the other hand, is the process by which nouns are sorted into various classes. This is a much broader role, and can be filled by gender, noun classes, classifiers, etc. in other languages. Even in Hmong, classifiers are not the only parts of speech that can classify, as we will see shortly.

Bisang terms any word that can perform any of these roles a *numerative*, and identifies a few key classes of numeratives. First are *class nouns*, which are very generic nouns that usually need to be further qualified. An example in English would be the word *tree*, which is very generic, like in (6a), but can be made much more specific, like in (6b). An example in Hmong is the word *tub* 'son', which on its own means 'son', but is often qualified like in (7b) to mean various other things, often occupations typically filled by young men.

(6) a. I have a tree in my yard.
b. I have a birch tree in my yard.

(7) a. Kuv pom ib tug tub.
I see one CLF(animate) son.
'I see a son.'
b. Kuv pom ib tug tub txib.
I see one CLF(animate) son servant.
'I see the manservant.'

Of the roles that numeratives can fill, class nouns can classify, but not individualize. As such, (8a) below is unacceptable, requiring a classifier like *tus* 'CLF(anim)' (realized as *tug* because of tone sandhi) to be acceptable, as in (8b) below.

(8) a. * Kuv pom ob tub txib.
I see two son servant.
Intended: 'I see two servants'
b. Kuv pom ob tug tub txib.
I see two CLF(animate) son servant.
'I see two servants.'

Another important class of numeratives are what Bisang confusingly calls *quantifiers*. To avoid confusion, I will call them by the more standard name *mensural classifiers*. Mensural classifiers measure out some quantity. Many English examples, like *mile*, *cup*, *gallon*, etc. are mensural classifiers. As such, classifiers like *cup* and its Hmong equivalent *khob*, as shown in (9) are mensural classifiers.

(9) a. I have three cups of water.
b. Kuv muaj peb khob dej.
I have three CLF(cup) water.
'I have three cups of water.'
c. * Kuv muaj peb dej.
I have three water.
Intended: 'I have three cups of water.'

Unlike class nouns, mensural classifiers *only* perform the role of individualization and not classification, which is why a sentence like (9c) is ungrammatical (*dej* 'water' has not been individualized), while (9b) is grammatical (*dej* 'water' has been individualized by *khob* 'cup'). Since mensural classifiers do not classify, they can in principle be used with any noun.

The final class of numeratives described by Bisang is called *classifiers* by Bisang, which we will call *sortal classifiers* to avoid confusion. These are the classifiers described in the previous section. Sortal classifiers are rare in English. One potential example, however, is *piece* in (10a) below. In particular, note that (10b) is ungrammatical.

(10) a. I have four pieces of furniture in my dorm.
b. * I have four furnitures in my dorm.

On its own, the noun *furniture* refers to the abstract concept of furniture, until it is made concrete by the classifier *piece*. This is very different from discussing 300 pounds of furniture, for example. In *300 pounds of furniture*, *furniture* still does not refer to a single piece of furniture, and is merely measured out. Similarly, nouns like *miv* 'cat' in Hmong refer to the abstract notion of cats until made concrete by a classifier like *tus* 'CLF(animate)', which is demonstrated in (11) below. Likewise, since *tus* 'CLF(animate)' is a sortal classifier and thus classifies the following noun, it can only be used with animate nouns, which is why (11c) is ungrammatical, as *lub* 'CLF(round)' can only be used with bulky, round-ish nouns.

(11) a. Kuv muaj ob tug miv.
I have two CLF(animate) cat.
'I have two cats.'
b. * Kuv muaj ob miv.
I have two cat.
Intended: 'I have two cats.'
c. * Kuv muaj ob lub miv.
I have two CLF(round) cat.
Intended: 'I have two cats.'

Bisang continues to discuss several other interesting topics, but this is the very basic setup of his model of Hmong classifiers that I will be formalizing and extending in this thesis.

2.4 Mensural vs Sortal Classifiers

The difference between mensural and sortal classifiers is a very important one, so it will be handy to develop some diagnostics. Following the observations in (Her 2012), we can see that numerals scope over sortal classifiers while they do not scope over mensural classifiers. For instance, compare (12) and (13) below. In (12), the numeral *ib* 'one' scopes over the noun *pob* 'ball', so this sentence implies that the speaker has one ball. On the other hand, in (13) below, the numeral *ib* 'one' does not scope over the noun *pob* 'ball', and this sentence does not imply that the speaker has one ball. In order to indicate that the speaker has one ball and that ball weighs one pound, an extra phrase like in (14) would need to be used.

(12) Kuv muaj ib lub pob.
I have one CLF(round) ball.
I have one ball.

(13) Kuv muaj ib phaus pob.
I have one CLF(pound) ball.
I have one pound of balls.

(14) Kuv muaj ib lub pob uas hnyas ib phaus.
I have one CLF(round) ball COMP weighs one CLF(pound)
I have a ball that weighs one pound.

This observation allows for a diagnostic to distinguish between mensural and sortal classifiers, reproduced as (15) below from (Her 2012).

(15) Given a well-formed [Num *X* N], if Num scopes over N, then *X* is sortal, otherwise *X* is mensural.

We can verify that *tus* 'CLF(anim)' and *daim* 'CLF(flat)' are sortal classifiers and that *khob* 'cup' and *phaus* 'pound' are mensural classifiers, at least in the contexts below. In particular, we can see in (16) that *peb* 'three' scopes over *miv* 'cat', as in order for this sentence to be true, the speaker must have at least three cats.

(16) Kuv muaj peb tug miv.
I have three CLF(anim) cat.
'I have three cats.'

Likewise, in (17) here, *ob* 'two' scopes over *teb* 'field', as there must be two fields in order for this sentence to be true.

(17) Ob daim teb ntawd loj loj heev.
Two CLF(flat) field that big big very.
'Those two fields over there are very big.'

On the other hand, sentence (18) does not imply that the speaker has three waters, whatever that would mean, and the scope only makes it to *khob* 'cup'.

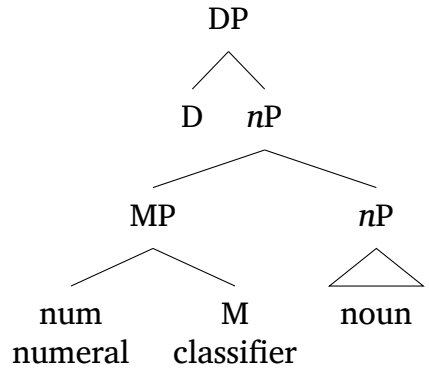
(18) Kuv muaj peb khob dej.
I have three CLF(cup) water.
'I have three cups of water.'

Likewise, sentence (19) does not imply that the pig ate ten grains of rice.

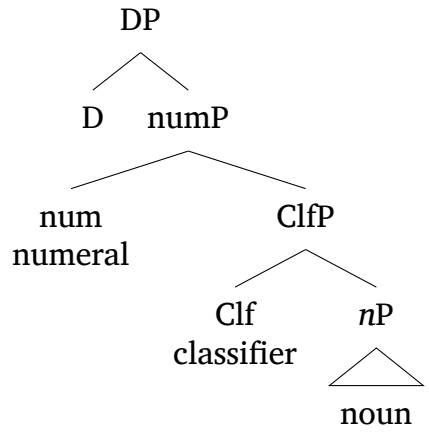
(19) Tus npua haws peb khob dej
CLF(anim) pig drink three cup water.
'The pig drank three cups of water.'

This difference is reflected in the structures for these classifiers shown in Bale, Coon & Arcos López (2019).

(20) Measure structure:



(21) Partition structure:



As we can see, the noun in (20) is not in scope of the numeral, while it is in (21). As Bale, Coon, and López argue in Bale, Coon & Arcos López (2019), the situation is more complicated than all mensural classifiers have a measure structure and all sortal classifiers have a partition structure, but the diagnostic given above is at least enough to distinguish these two structures, which is sufficient for our purposes.

2.5 Exceptions

There are two very interesting exceptions to Bisang's model that come together to create the main puzzle this thesis will solve. This puzzle was introduced, as far as I can tell, in Ratliff (1991). The two outliers are the classifier *cov* and underspecified nouns.

The classifier *cov* is used to make countable nouns plural, for groups, or to indicate an abstract mass (Ratliff 1991, Bisang 1993, White 2019). It likely derives from a classifier for groups that has since grammaticalized and abstracted to become a generic plural classifier. In (22) below, we see *cov* (here realized as *co* because of tone sandhi) used to make 'rattan' plural, or an abstract mass. However, according to Ratliff, when we add a numeral, like in (23), it ends up meaning something more akin to 'group'.

(22) Hmoob **cov** tsev txhua txhua lub muaj nthab tib si.
Hmong **cov** house every every CLF(round) has platform all.
'Every Hmong house has a storage platform.' (Vwj et al. 1983: p. 134)

(23) Kuv pom ib **co** liab.
I see one **cov** monkey.

'I see a group of monkeys' (Mottin 1978: p. 55)

Ratliff further predicts that, while unattested in her data, sentences like (24) below should be possible.

(24) Kuv pom ob **co** liab.
I see two **cov** monkey.
'I see two groups of monkeys.'

My consultant, however, rejected sentences like (24), and also rejected the group interpretation of sentences like (23), preferring to translate it as 'I see some monkeys', and indicating that it can be true even if the monkeys were not together in a group. He even indicated that a sentence like (25) could be true if various monkeys were sighted individually throughout the course of the day (though not if only one monkey was sighted repeatedly).

(25) Kuv pom ib **co** liab naag mo
I see one **cov** monkey yesterday
'I saw some monkeys yesterday.'

This contradicts Ratliff's findings. However this doesn't necessarily mean that Ratliff was wrong. It's possible there is some variation among speakers over whether numerals other than *ib* 'one' can be used with *cov*, or even that Hmong has changed in the thirty years since Ratliff (1991), given that my consultant is young and Hmong changes rapidly.

Thus as a word that makes nouns plural, *cov* appears not to perform the role of classification. However, syntactically, it patterns like a classifier, filling the role of individualization. *Cov* isn't the only exception to Bisang's model, however.

Underspecified Nouns

The other piece of this puzzle comes from underspecified nouns. Underspecified nouns are a class of nouns in Hmong of nouns that are vague in reference unless a classifier is present (Ratliff 1991). The examples given by Ratliff are *ntawv* 'paper' and *lus* 'speech', each of which can mean a myriad of different things depending on the classifier used, as shown in Table 3 below.

ntawv		lus	
classifier	meaning	classifier	meaning
daim ntawv	paper	kab lus	line of writing
nplooj ntawv	page	lo lus	word
phau ntawv	book	zaj lus	sentence
tsab ntawv	letter	ntsiab lus	important word

Table 3: Some example meanings of *ntawv* and *lus*

Since the classifiers are necessary to determine the meaning of *ntawv* or *lus* and since many classifiers also function as nouns, it seems reasonable to claim that these classifier-noun combinations are really just compound nouns or class noun-noun combinations. However, as we can see in (26), *phau* suffices as a classifier, where the other

nouns in the compound *kws kho mob* ‘doctor’ do not in (28). Even in the case of *tub txib* ‘manservant’, where *tub* ‘son’ is a class noun, like in (29), we still need a classifier in order for it to be grammatical.

(26) Kuv nyeem peb phau ntawv.
I read three CLF(book) paper.
‘I read three books.’

(27) Kuv pom peb tug kws.kho.mob.
I see three CLF(animate) doctor.
‘I saw three doctors.’

(28) * Kuv pom peb kws.kho.mob.
I see three doctor.
Intended: ‘I saw three doctors.’

(29) * Kuv pom peb tub txib.
I see three son servant.
Intended: ‘I saw three manservants.’

(30) Kuv pom peb tug tub txib.
I see three CLF(animate) son servant.
‘I saw three manservants.’

In short, Hmong has certain constructions, like *phau ntawv* ‘book’, that look like compounds or class noun-noun pairs (both of which are easily explained within Bisang’s model), but actually act syntactically like classifier-noun pairs. These two exceptions to Bisang’s model are closely related and combine to create the main puzzle of this thesis.

2.6 Main Puzzle

It is these underspecified nouns that can occur with their classifier and *cov* in an unexpected double classifier construction. For example, in (31), we see the both the classifier *cov* and the classifier *phau* occuring with *ntawv* ‘paper’, while in (32) we see the both the classifier *cov* and the classifier *kab* occuring with the noun *lus* ‘speech’.

(31) cov phau ntawv dab neeg tseem pab kom lawv txawj nyeem
CLF(cov) CLF(book) paper story still help cause them able read
‘The story books nonetheless helped them learn to read’ (Vang 1985: p. 28)

(32) siv sau ib co kab lus xyaum nyeem
use write one CLF(cov) CLF(line) speech practice read
‘write some sentences to practice reading’[3] (Vwj et al. 1983: passim)

This is in contrast to other nouns and other classifiers. As we can see in (33), this double classifier construction with *cov* does not work with nouns other than underspecified nouns. Additionally, as we can see in (34), this construction also doesn’t work with classifiers other than *cov*.

[3]My consultant isn’t particularly happy with this sentence, preferring *siv sau ib co kab lus thiab xyaum nyeem lawv*, adding *thiab* ‘and’ and *lawv* ‘them’ to the end of the sentence. This, however, doesn’t impact the usage of *cov* in this sentence as a plural.

(33) * Kuv muaj cov tus miv
I have CLF(cov) CLF(anim) cat
Intended: 'I have some cats'

(34) ? Kuv muaj peb daim phau ntawv
I have three CLF(flat) CLF(book) paper
Intended: 'I have three books'

This is Ratliff's claim at least. We will see later that this double classifier construction is more general than first seen in Ratliff (1991). In particular, sortal classifiers can co-occur with mensural classifiers before mass nouns. Because of this, (34) is actually marginally acceptable, but is still a rather strange sentence that we will discuss more later.

Before we can get to that, however, we will first formally describe the syntax and semantics of Hmong classifiers.

3 Syntax and Semantics of Classifiers

3.1 Framework

Throughout this thesis, I will be working within the Minimalist Program (MP) (Chomsky & Kenstowicz 2001, Chomsky 2000) and Distributed Morphology (DM) syntactic frameworks, as outlined in Citko (2014) and Noyer (2006) respectively. The only aspect of DM that I will be using is the idea that roots do not have an intrinsic category and need to be converted into that category by a head.

I will also make some semantic arguments as well. These are based on the semantic model of classifiers put forward in Little, Moroney & Royer (2022), which itself is based on Link's model of number and plurality summarized in Landman (1989). I will describe this model in more detail below.

3.2 Syntax

Structure of a DP

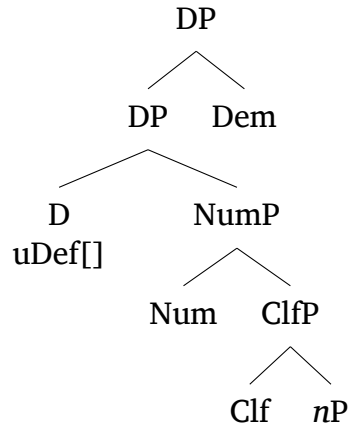
There are a lot of important functional projections within a DP (Watanabe 2006). Figuring out all these projections and how they come together is quite a challenge. Watanabe (2006) thoroughly analyzes the structure of DPs in Japanese, which has the advantage of most of these projections being overtly realized as particles, allowing them to more explicitly determine where these functional projections can go and how they can move. In particular, Watanabe posited at least four projections above N, namely #P, CaseP, QP, and DP, responsible for classifiers, case, quantifiers, and determiners respectively.

Taking the existence of these projections as a starting point, I will argue some more specifics as to how they work in Hmong in particular. Morphological case is not present in Hmong, so I will not show the CaseP projection. To be more consistent with other terminology, I will call #P ClfP and posit that numerals head their own NumP projection rather than be in Spec ClfP, a claim I will further justify below. Furthermore, I claim that demonstratives appear in the specifier of DP. D is usually phonologically null, but has an uninterpretable definiteness feature that can be valued either by a

demonstrative in its specifier or a classifier moving up to its head, but defaults to indefinite. Finally, I will use *n*P rather than N in line with DM, since the internal structure of Hmong nouns will become very relevant to the final analysis.

Putting these together, we can argue that, in Hmong at least, DPs have the structure shown in (35) below.

(35)



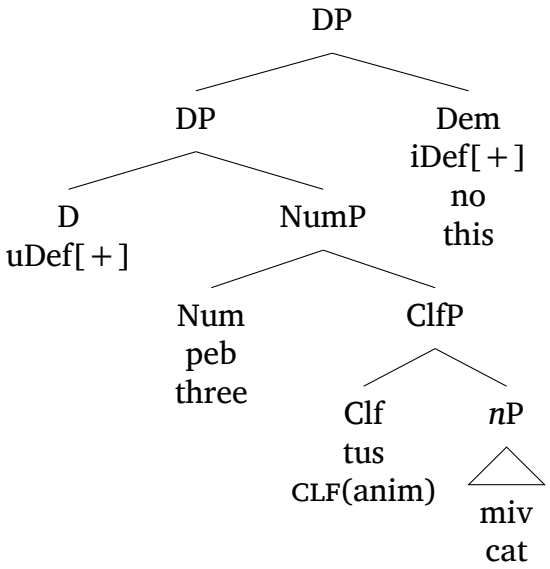
Note that Rothstein (2010) argues based on semantics that mensural classifiers and sortal classifiers have different structures. However, Bale, Coon & Arcos López (2019) argue that all classifiers in the Mayan language Ch'ol have the measure structure associated with mensural classifiers, and I will make the opposite claim for Hmong: all Hmong classifiers have the partition structure associated with sortal classifiers.

Demonstration

So far I have just made several abstract claims. To make things more concrete, as well as to provide some evidence for these claims, I will now analyze some data with this model. First, we can see the structure shown in (35) filled out in (36) below.

(36) a. Peb tug miv no
three CLF(anim) cat this
'These three cats'

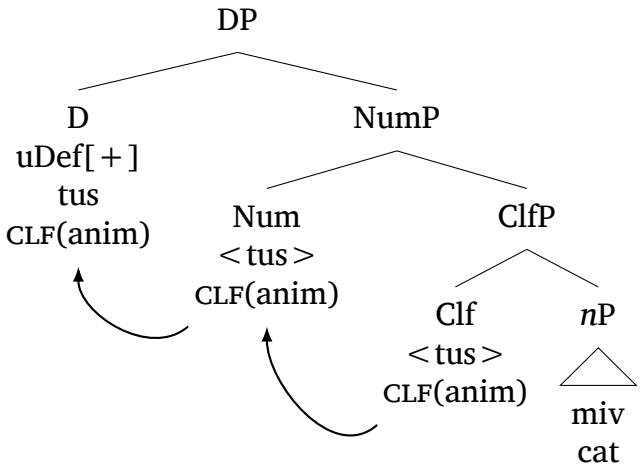
b.



This model handles the definiteness of bare classifier phrases quite well in (37) below. In particular the classifier is free to head move up to D, causing the DP to have a definite interpretation. In particular, in order to satisfy the Head Movement Constraint, it must move to Num first, which isn't a problem, as Num is empty.

(37) a. tus miv
CLF(anim) cat
'the cat'

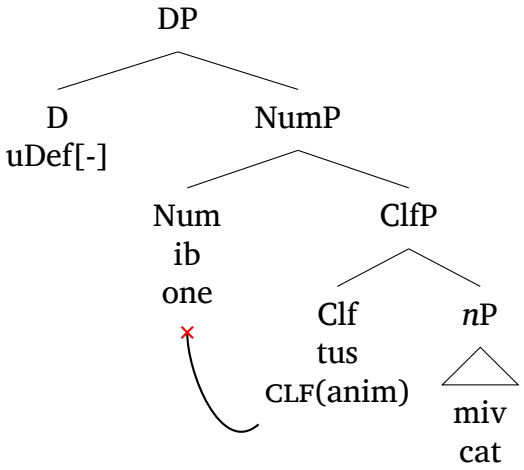
b.



If a numeral is present, like in (38) below, the movement is blocked due to the Head Movement Constraint, resulting in a phonologically null D head, and thus an indefinite interpretation. Since only heads can block head movement, this implies that Num heads its own projection, rather than being in Spec ClfP, as posited by Watanabe (2006).

(38) a. ib tug miv
one CLF(anim) cat
'a cat'

b.



This is quite an important piece of evidence for this theory. One of the big differences between the measure and partition structures shown in (20) and (21) is whether or not Num heads its own projection. Since Num being a head is directly linked to whether or not the classifier can move, and thus the DP can have a definite interpretation, we can easily check which structure a classifier uses by whether or not the DP can have a definite interpretation.

Each of these functional projections, in addition to performing various syntactic roles, perform various semantic roles. In particular, D is responsible for definiteness, Num is responsible for number, and Clf is responsible for specificity (Bisang's individualization). We can get even more precise about this by discussing the formal semantics of Hmong classifiers. Demonstratives are just responsible for deixis and act semantically like adjuncts.

3.3 Semantics

Little, Moroney & Royer (2022) lays out several ways of semantically modeling nouns, classifiers, and numerals. Furthermore, the semantics of nouns, classifiers, and numerals can vary significantly between, and even among, languages. In this section I provide the necessary background for the model in Little, Moroney & Royer (2022) that is most compatible with Hmong.

Definitions

The model of plurality, LP, developed by Link across several papers and outlined in Landman (1989), has the mathematical structure of a join-semilattice. In particular, there are individual objects as well as the *join* of multiple objects. Importantly, both are of semantic type e, meaning, for example, if a refers to my cat and b refers to your cat, then ab (alternately denoted $a \wedge b$ or $a + b$) refers to both your cat and my cat as concrete individuals, rather than the set of both of our cats. The plural object ab is made up of two *parts*, my cat and your cat, which we can express via $a \leq ab$ and $b \leq ab$ (or alternatively $a \sqsubseteq ab$).

If the join of two objects is still of type e, then predicates of type $\langle e, t \rangle$ should be able to take them as arguments. Given a predicate P of type $\langle e, t \rangle$ and an atom a of type e, $P(a)$ functions normally. If a is not an atom, we can define $P(a)$ to be true if and only if there exist b_i such that $a = b_1 b_2 \cdots b_n$ and $P(b_i)$ is true for every i. For example, if a and b are again my cat and your cat respectively, then $[\![\text{cute}]\!](ab)$ is true if and only if $[\![\text{cute}]\!](a)$ and $[\![\text{cute}]\!](b)$ is true, i.e. both of our cats are cute if and only if each one individually is cute.

With this notation, we can define a few important concepts:

(39) An *atom* is a term a such that if $b \leq a$, then $b = a$, i.e. a has no parts other than itself.

(40) A set A is *atomic* if for all $b \in A$, there exists an atom $a \in A$ such that $a \leq b$.

(41) A set/predicate P is *cumulative* if the join of any things in P are also in P, i.e. P forms a join-semilattice on its own.

(42) A set/predicate P is *quantized* if no proper part of something in P is in P.

Intuitively speaking, an atom is a singular thing, rather than a plural thing. Count nouns in English are atomic and quantized, but not cumulative. So, for example, the noun *cat* refers to the set of all cats. Each individual cat in this set is an atom. Alternatively, you could consider cats as being made up of smaller parts, some of which are atoms. This is not a problem however, because no part of a cat is itself a cat. Additionally, a pair of cats is not a cat, so *cat* is not cumulative. Mass nouns in English, however, are neither atomic nor quantized, but are cumulative. For example,

any part of water is itself water, and any amount of water can be broken into smaller parts (practically), so it cannot be an atom.

This is not the case in English, but it is possible for a noun to be cumulative and atomic, which is the case for most nouns in Hmong. For example, the noun *miv* 'cat' is cumulative and atomic. In particular, an individual cat is an atom, and, while a pair of cats is not a cat, a pair of miv is still a miv.

(43) Ntawd yog [Oliver thiab Luna]$_i$. Nkawd$_i$ yog miv.
That COP [Oliver and Luna]$_i$. 3DU$_i$ COP cat.
'These are [Oliver and Luna]$_i$. They$_i$ are cats.'

With these definitions, we can now talk about material more directly relevant to this thesis. In particular, as we have seen, there are three functional heads between *n* and D, each of which has a specific semantic function that can be more formally described with this model.

Specificity

In particular, classifiers are responsible for specificity. Nouns in Hmong are atomic but also cumulative, meaning that, for example, *miv* 'cat' does not refer to a single cat, but all possible groupings of cats. A classifier forces the noun to refer to a set of individual objects, rather than a set of all possible groupings. It does this by essentially picking out the atoms from an atomic noun. This can be written more formally as shown below.

(44) $[\![\text{Clf}]\!] = \lambda P.\{x \in P \mid x \text{ is an atom}\}$ (Little, Moroney & Royer 2022)

From here, a classifier-noun combination is semantically identical to a noun in English, as it simply refers to the set of atoms and is no longer cumulative.

For completeness sake, however, we will discuss the remainder of the functional heads between *n* and D, beginning with Num.

Number

Number is intuitively rather straightforward, but rather tricky to define formally. At this point in the tree, the predicate is the set of atoms. A number, *peb* 'three' for instance, then creates the set of all joins of three elements from the predicate. One way to define number more formally is shown below.

(45) $[\![\text{num}]\!] = \lambda P.\{a_1 \wedge a_2 \wedge \cdots \wedge a_{\text{num}} \mid a_i \in P \text{ distinct}\}$

This differs slightly from the definition given in Little, Moroney & Royer (2022), but only to avoid establishing a lot more machinery and notation.

Definiteness

At this point, we now have a set of all joins of *n* atoms, and D can finally be involved. D's role was definiteness, so its job is to pick out some contextually relevant element from our predicate if its head is filled meaning the DP is definite. This is annoyingly difficult to formally write out, and beyond the scope of this thesis. However, I am happy to simply note that a definite D is type $\langle\langle e,t\rangle,e\rangle$ and not worry about how precisely D chooses an element of the predicate.

On the other hand, things are a bit more complicated if D is indefinite. In this case, D acts more like an existential quantifier. In English, for instance, if I say "a car is big," that means that there exists some thing that is both a car and big, not necessarily that some specific car is big. Thus we can model indefinite D as shown in (46) below.

(46) $[\![\text{D}]\!] = \lambda P.\ \lambda Q.\ \exists x$ such that $P(x)$ and $Q(x)$

Deixis

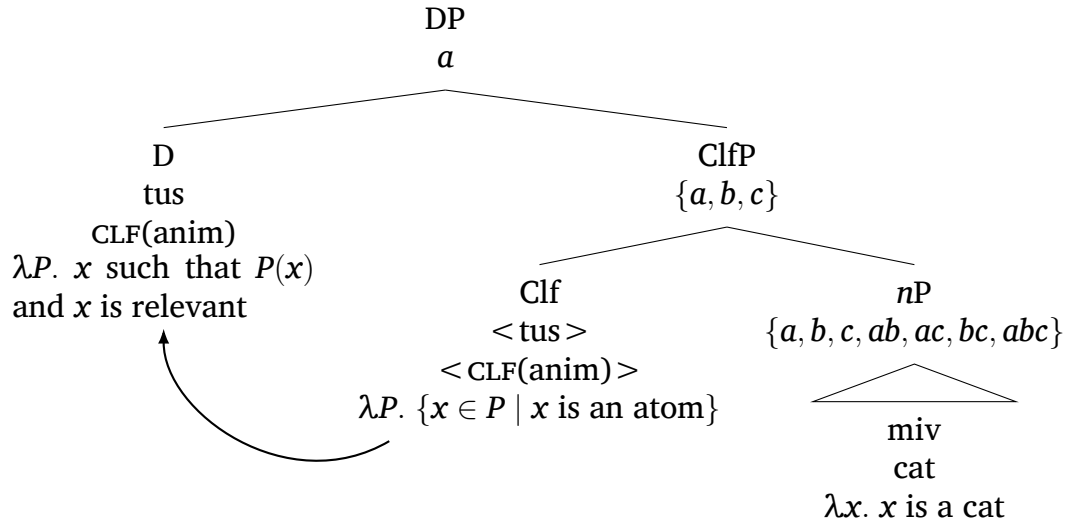
Fortunately, demonstratives, as specifiers, are simpler. Since specifiers are the same as adjuncts in the minimalist program, we can view a demonstrative as simply being predicates of type $\langle e, t\rangle$. Such a predicate can then be combined with the main noun via predicate modification. For instance, the demonstrative *no* 'this' returns true if and only if its argument is close to the speaker. Completely categorizing and modeling Hmong demonstratives is well beyond the scope of this thesis, and not particularly important to the argument I am making.

Derivation

To make all this concrete, we will look at a few examples. Throughout these examples, suppose there are three cats, namely a, b, and c, with a and c close to us and a being somehow contextually relevant. First, let's look at a simple example definite DP, namely (47) below.

(47) tus miv
CLF(anim) cat
'the cat(s)'

(48)



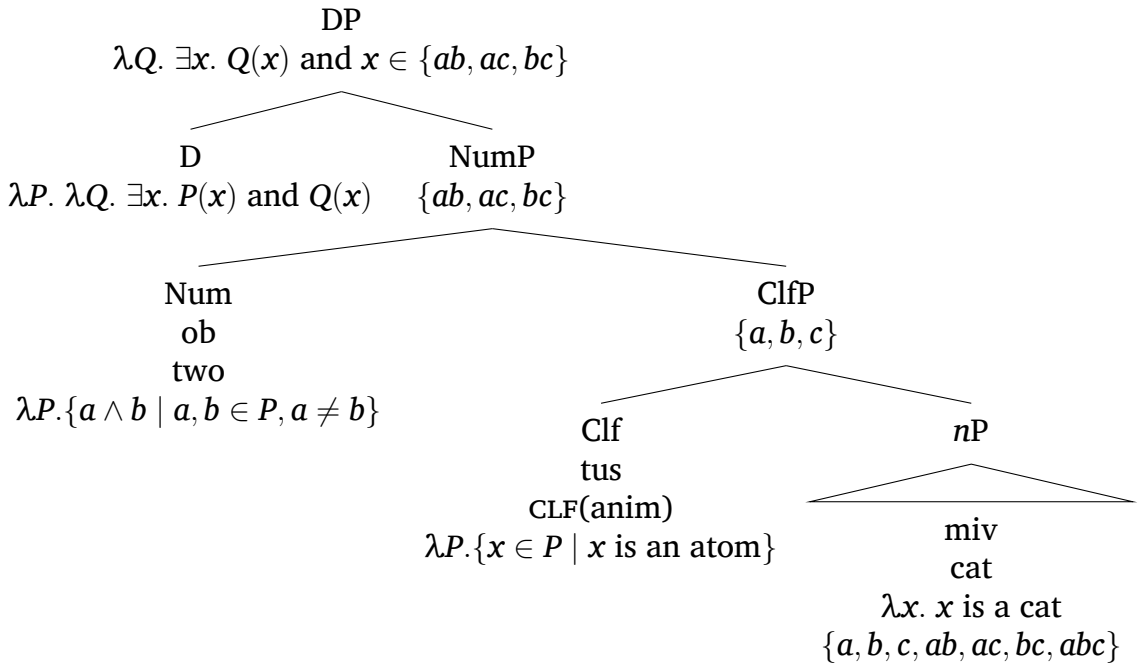
In this instance, the denotation of *miv* 'cat' would be $\{a, b, c, ab, ac, bc, abc\}$. Then the Clf head *tus* 'CLF(anim)' picks out all the atoms, yielding $\{a, b, c\}$. Finally, since D is definite as a result of its head being filled, it picks out a contextually relevant cat, resulting in the DP having denotation a as we expect.

Now let's look at the more complicated DP (49) below. This time, since the numeral *ob* 'two' is in the way, the classifier *tug* 'CLF(anim)' cannot move up to D in order to make it definite. As a result, it defaults to an indefinite interpretation. Not only does

the Head Movement Constraint and Num heading its own projection explain syntactic properties of Hmong DPs, it also guarantees that the semantics works out as expected.

(49) ob tug miv
two CLF(anim) cat
'two cats'

(50)



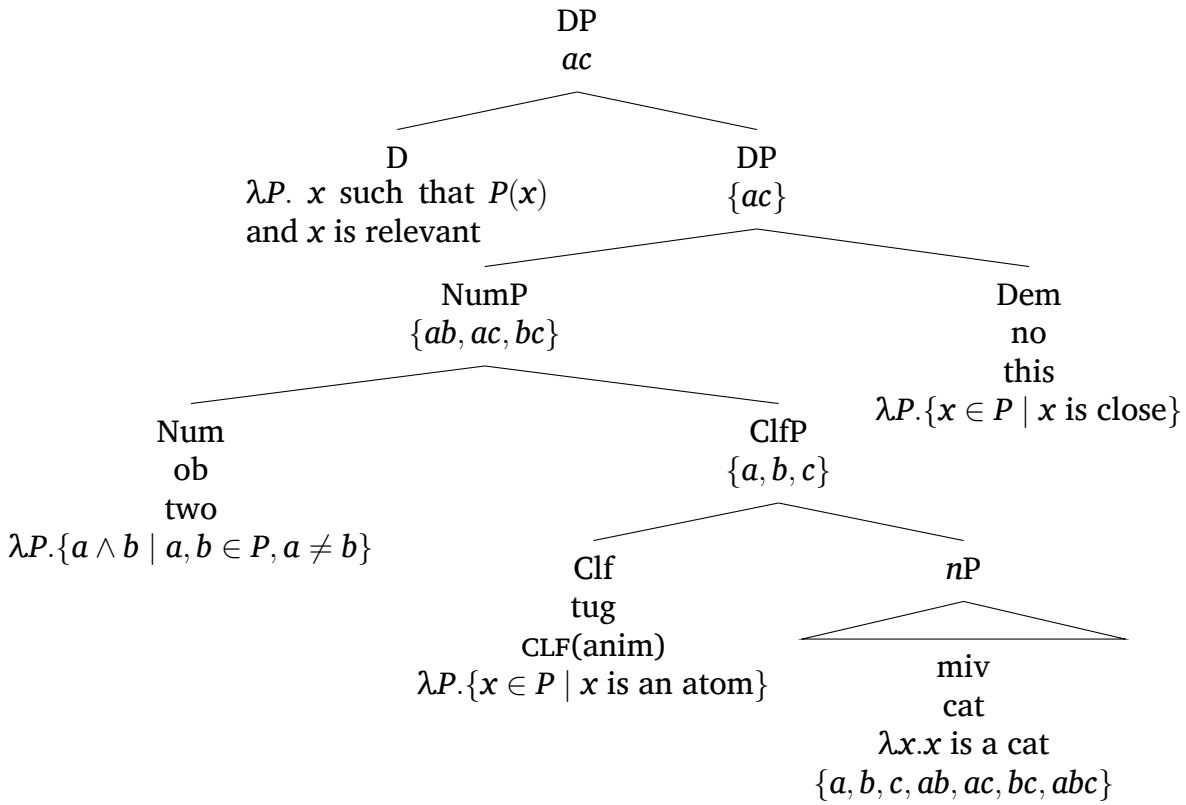
Again, *miv* 'cat' begins with denotation $\{a, b, c, ab, ac, bc, abc\}$ and *tus* 'CLF(anim)' changes it to $\{a, b, c\}$. Then the numeral *ob* 'two' converts this denotation to the set of all joins of pairs of cats, i.e. $\{ab, ac, bc\}$. At this point, since D is indefinite, it acts like an existential quantifier. If the whole sentence were, for example *ob tug miv loj* 'two cats are big', then the proposition Q from the above tree would have denotation $\lambda x.\ x$ is big, causing the entire sentence to have expected truth conditions

$$\exists x.\ x \in \{ab, ac, bc\} \text{ and } x \text{ is big.}$$

Finally, let's look at a definite DP with a numeral, shown in (51) below.

(51) ob tug miv no
two CLF(anim) cat this
'these two cats'

(52)



This time, since the specifier of D is filled, D becomes definite, giving it the denotation we saw in (48). However, before D gets to pick out a relevant element of $\{ab, ac, bc\}$, Dem first picks out only the pairs of cats that are close to the speaker, resulting in the set $\{ac\}$. Now D can pick the relevant pair of cats from the set, resulting in the entire DP having denotation *ac* as expected.

I can now use this analysis as a starting point to explain the double classifier construction in Hmong involving *cov* and underspecified nouns.

4 Analysis

4.1 Desiderata

Any successful analysis of Hmong classifiers, and particularly *cov* and underspecified nouns, should account for the points shown in (53) below.

(53)
a. Bare classifier phrases have a definite interpretation regardless of classifier.
b. Numeral + classifier + noun phrases have an indefinite interpretation regardless of classifier.
c. Double classifier constructions, excluding the handful of cases previously discussed, cannot happen.
d. The previously discussed double classifier constructions can happen.

4.2 Compound

The analysis proposed by Ratliff (1991), is that classifiers for underspecified nouns actually form a compound with the noun, at least when *cov* is present. This analysis runs into a few problems. In particular, the noun *tsiaj-ntawv* 'letter (of the alphabet)' appears to be a compound of the classifier *tsiaj* 'beast' with the familiar noun *ntawv* 'paper'. The difference between *tsiaj-ntawv* and *phau ntawv* is that an additional classifier is not necessary in (54), while it is in (56).

(54) Kuv muaj peb phau ntawv.
I have three CLF(book) paper.
'I have three books.'

(55) * 26 tsiaj-ntawv
26 CLF(beast)-paper
Intended: '26 letters of the alphabet'

(56) 26 tus tsiaj-ntawv
26 CLF(anim) CLF(beast)-paper
'26 letters of the alphabet' (Vwj et al. 1983: p. 3)

Ratliff addresses these issues, arguing that the classifier only compounds with the underspecified noun when *cov* is present. While effective, this approach is perhaps overly stipulative and unnecessary.

Bisang (1993) put forth a very similar argument, claiming that the classifiers of underspecified nouns are not classifiers, but rather class nouns. This, however, runs into nearly the same problems. In particular, class noun + noun combinations still require a classifier when a numeral is present, while classifier + underspecified noun combinations do not.

(57) Kuv muaj peb phau ntawv.
I have three CLF(book) paper.
I have three books.

(58) * Kuv pom peb tub txib.
I see three son servant.
Intended: 'I see three manservants.'

(59) Kuv pom peb tug tub txib.
I see three CLF(anim) son servant.
'I see three manservants.'

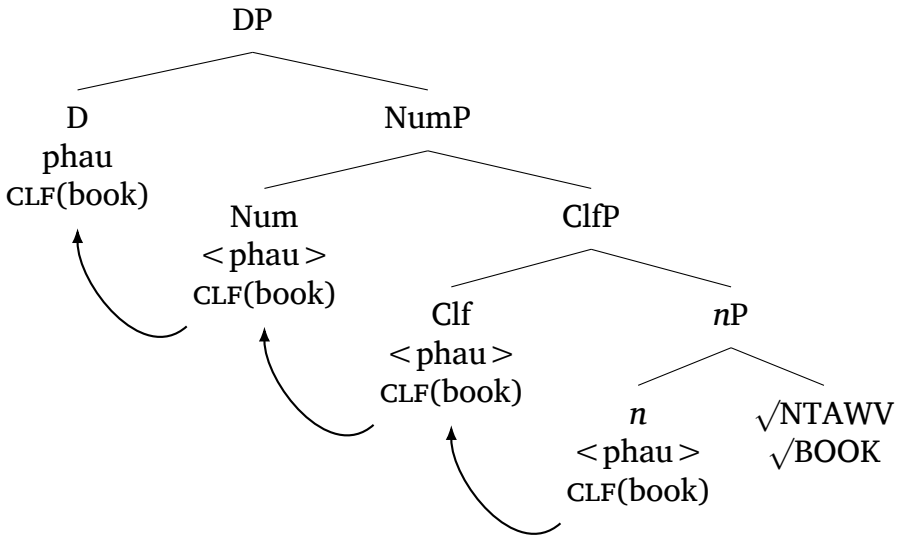
It is also possible to address these issues by arguing that classifiers of underspecified nouns are only class nouns when *cov* is present, but this has the same motivation problems that Ratliff's proposal has.

4.3 My Proposal

I argue that classifiers for underspecified nouns are actually *n* heads. Intuitively, this makes sense because underspecified nouns are semantically underspecified and incomplete without their classifier, which is precisely what *n* is for. Allowing this *n* head to head move up to Clf if it is unoccupied, but being able to remain in *n* if Clf is occupied explains the strange behavior of these apparent classifiers.

(60) a. phau ntawv
CLF(book) paper
'the book'

b.

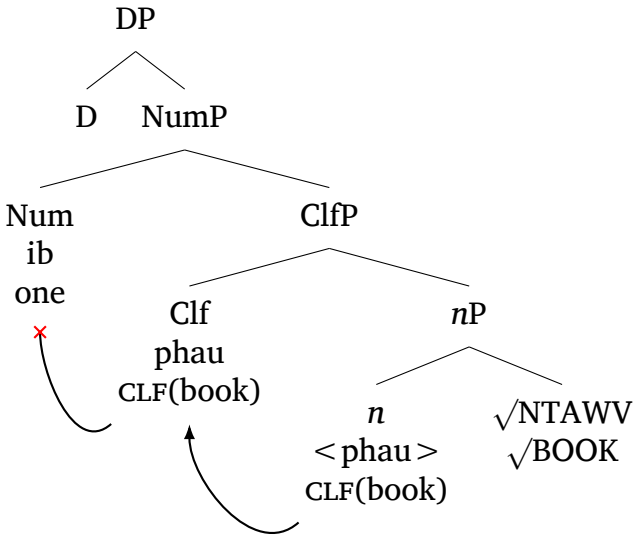


Then, since the *n* head is filled by *phau*, √NTAWV becomes a noun meaning book whose denotation is the join semi-lattice of all books. Likewise, since the Clf head is filled, *ntawv* is made into a set of atoms. Since *phau* doesn't have any number information, nothing happens as a result of *phau* stopping off in Num. Finally, since *phau* fills the D head, the DP ends up with a definite reading.

This model handles the indefinite case just as well, in a very similar way. The only difference is that now the Num head is filled, meaning *phau* cannot head move up to D through Num.

(61) a. ib phau ntawv
one CLF(book) paper
'a book'

b.

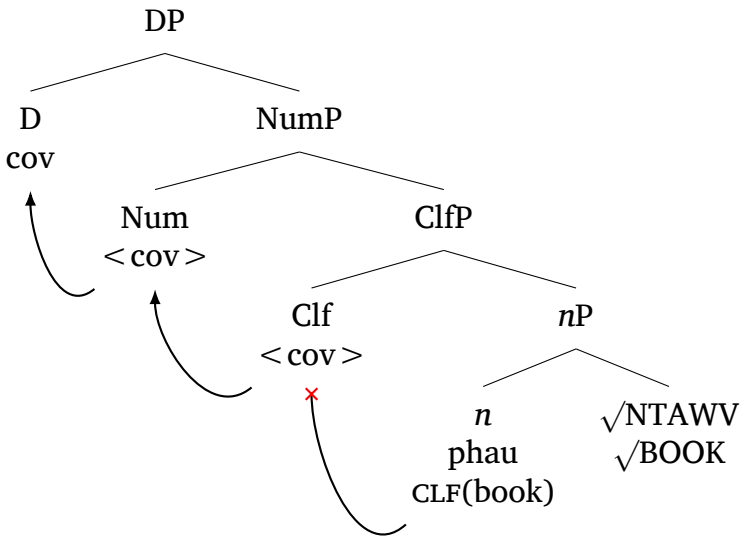


And now we can see why *cov* can co-occur with *phau*, both in definite and indefinite settings. *Cov* can fill the Clf head, blocking *phau* from moving up to Clf. This is not possible with fully specified nouns, as both the classifier and *cov* would want to occupy

Clf, while only one can.

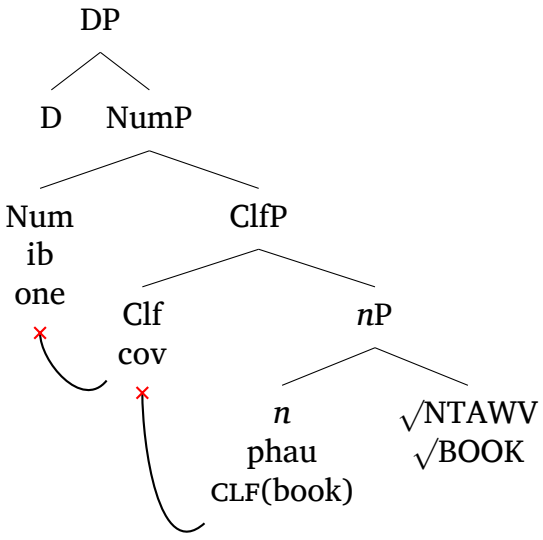
(62) a. cov phau ntawv
cov CLF(book) paper
'the books'

b.



(63) a. ib co phau ntawv
one cov CLF(book) paper
'some books'

b.



This also suggests that it might be possible for other classifiers other than *cov* to occupy the Clf head, and this is indeed possible. It works well with mensural classifiers, as one might expect, as shown in (64) below.

(64) Kuv muaj kaum phaus phau ntawv.
I have ten pound CLF(book) paper.
'I have ten pounds of books.'

The structure for (64) is exactly like (63b), just with *cov* replaced by *phaus*, another mensural classifier. Things get more interesting, however, when we attempt to replace

phaus by a sortal classifier. As we can see in (65), it is possible to add a sortal classifier, however semantically we get something quite unexpected.

(65) Kuv daim phau ntawv ntev heev.
I CLF(flat) CLF(book) paper long INTS
'My book (chapter) within the book is very long.'

According to my consultant, this sentence is quite strange and marginal, but acceptable. In fact, he was the one to bring up this sentence, not me. This is compatible with my analysis, but is still warrants further investigation. The syntax, semantics, and pragmatics of Hmong classifiers, particularly in these more marginal cases, is a rich area for future research, that could be quite illuminating for the study of classifiers more broadly, given the robustness and complexity of Hmong's classifier system.

5 Complications

So far, this model appears to be working very well, explaining (53a), (53b), and (53c) from the wishlist. However, new data poses some problems for it. In particular, we see *cov* co-occuring with other classifiers in very specific circumstances, like in (66) below.

(66) Kuv muaj cov khob dej nyob ntawm lub rooj.
I have cov CLF(glass) water live at CLF(round) table
'I have the glasses of water on the table.'

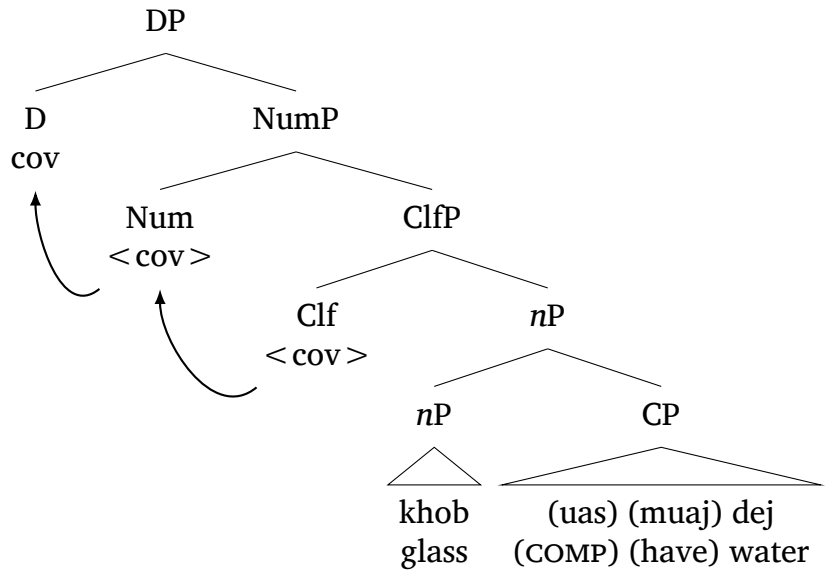
However, given Hmong's propensity for relative clauses, often without overt complementizers, it is very reasonable to expect something else to be going on here. In fact, my consultant confirmed that (66) is equivalent to the more explicit (67) shown below.

(67) Kuv muaj cov khob uas muaj dej nyob ntawm lub rooj.
I have cov CLF(glass) COMP has water live at CLF(round) table
'I have the glasses that have water on the table.'

This would suggest a structure like (68b) for (68a) below.

(68) a. cov khob dej
cov CLF(glass) water
the glasses of water

b.



While appealing, this analysis unfortunately does not quite work. If it were the case that *khob* 'glass' were the noun, then we would expect an additional classifier to appear when counting glasses of water. However, as we can see from (69) below, this is not always the case. This suggests that, at least in sentences like (69), *dej* 'water' is the noun, not *khob* 'glass'.

(69) peb khob dej
three CLF(glass) water
'three glasses of water'

This gets even more complicated however, because sentences like (70) and (71) are allowed.

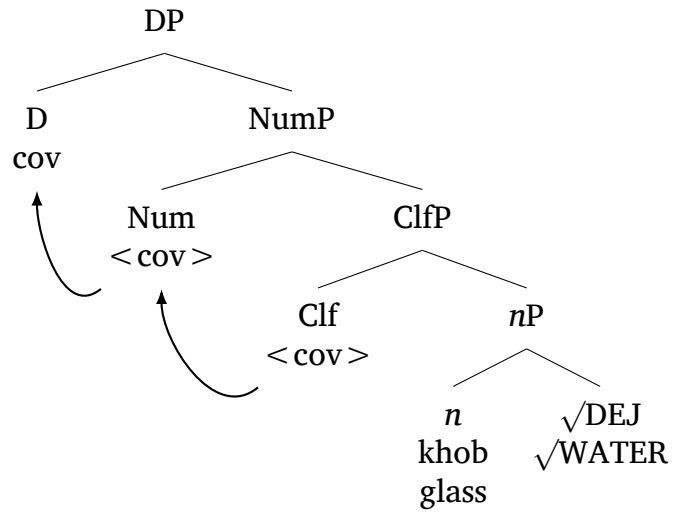
(70) peb lub khob dej
three CLF(round) glass water
'three glasses of water'

(71) peb lub khob uas muaj dej
three CLF(round) glass COMP have water
'three glasses that have water'

This suggests that a structure entirely analogous to the one shown in (68b) is potentially possible for the specific case of sentences like (68a). This works, but I don't find it particularly convincing, since it fails to explain sentences like (69).

Alternatively, we could make the same argument as with *phau ntawv* 'book', arguing that *khob* 'glass' is an *n* head. This would suggest that the tree for (68a) is actually something more like (72).

(72)

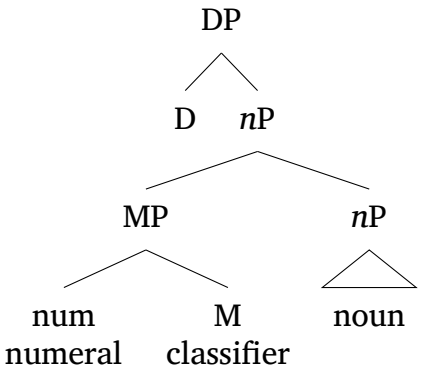


Syntactically, this works perfectly. The concern this time, however, is motivating why *khob* 'glass' is a *n* head.

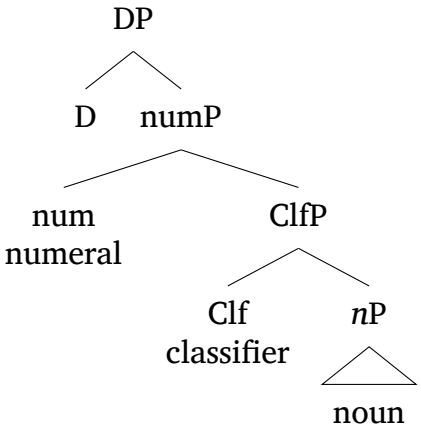
5.1 Mass Nouns

Before we can resolve this problem, we need to discuss the properties of mass nouns, since they seem to be important. Syntactically, a mass noun with its classifier is typically thought to have the measure structure shown in (20), reproduced below, at least according to Bale, Coon & Arcos López (2019).

(20) Measure structure:



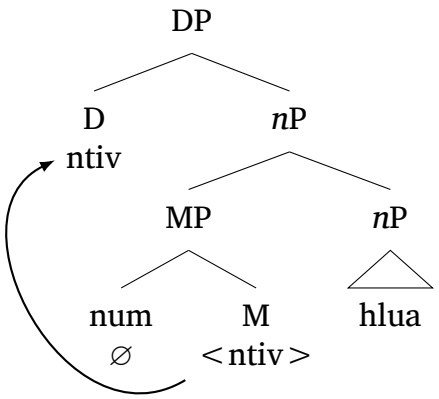
(21) Partition structure:



In the same way that Bale, Coon & Arcos López (2019) argue that all Ch'ol classifiers have this measure structure, I will argue that all Hmong classifiers have a structure similar to the partition structure shown above in (21). First, I show that Hmong classifiers cannot have the measure structure. Consider the mass noun *hlua* 'string'. Sentence (73) below is definite, meaning *ntiv* 'CLF(inch)' must have moved up to D. This is still compatible with the measure structure, as shown in (74) below.

(73) Ntiv hlua daj.
CLF(inch) string yellow.
'The inch of string is yellow.'

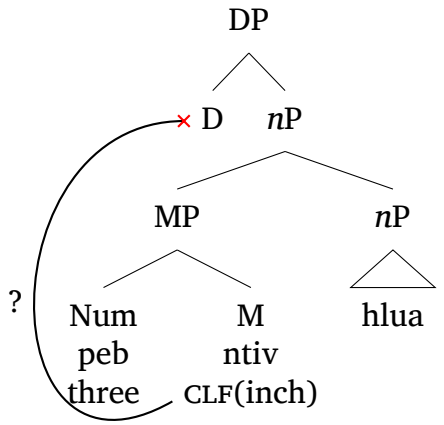
(74)



(75) Peb ntiv hlua daj.
three CLF(inch) string yellow.
'Three inches of string are yellow.'

On the other hand, (75) above is indefinite, meaning *peb* 'three' must have blocked *ntiv* 'CLF(inch)' from moving up. However, in a measure structure, *peb* 'three' is not a head, meaning it should not be able to block head movement.

(76)



Thus the structure shown in (76) cannot be correct.

Semantically, recall that mass nouns are not atomic; e.g. any amount of water can be broken up into small pieces that are still water. However, once we have applied a classifier, the mass noun is now atomic; e.g. a glass of water is an atom, as it cannot be broken down into smaller parts that are still glasses of water. In other words, mass nouns without a classifier behave differently from count nouns, but mass nouns with a classifier behave very similarly to count nouns.

5.2 My Resolution

The fact that the underspecified nouns *ntawv* 'paper' and *lus* 'speech' are both mass nouns combined with the fact that the mass nouns *dej* 'water' and *hlua* 'string' both seem to have the same double classifier construction leads me to believe that they are actually the same thing. We think of *ntawv* 'paper' as being underspecified because with different classifiers it can correspond neatly with many English nouns. On the

other hand, *dej* 'water' and *hlua* 'string' are also underspecified in that *dej* 'water' can mean 'glass of water', 'drop of water', 'jug of water', etc. and it isn't clear until the classifier is used.

Semantically, this all works as well. Mass nouns not behaving like count nouns until they have a classifier is exactly like what happens with underspecified nouns like *ntawv* 'paper'. *Ntawv* 'paper' is a mass noun referring to paper, but the *n* head *phau* 'book' breaks up the mass noun paper into atoms. At this point mass nouns and underspecified nouns alike behave exactly like count nouns, which is why sentences like (65) and (70) reproduced below are possible.

(65) Kuv daim phau ntawv ntev heev.
I CLF(flat) CLF(book) paper long INTS
'My book (chapter) within the book is very long.'

(70) peb lub khob dej
three CLF(round) glass water
'three glasses of water'

The only difference between a mass noun with its *n* head and a count noun is that the *n* head can move up to Clf, meaning a classifier is optional. This difference can be explained by positing that count nouns have only one possible *n* head, namely an empty one, reflecting the fact that there is only one natural way to divide up count nouns into atoms.

6 Conclusion

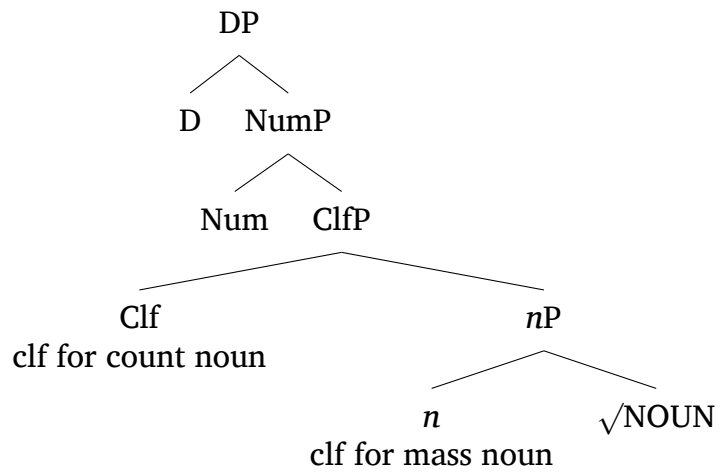
By this point we have explained everything from (53) reproduced below.

(53) a. Bare classifier phrases have a definite interpretation regardless of classifier.
b. Numeral + classifier + noun phrases have an indefinite interpretation regardless of classifier.
c. Double classifier constructions, excluding the handful of cases previously discussed, cannot happen.
d. The previously discussed double classifier constructions can happen.

In particular, bare classifier phrases have a definite interpretation regardless of classifier because the classifier is free to move up to D, making D definite. However, if a numeral is in the way, it cannot move up to D, making D indefinite. Additionally, double classifier constructions usually cannot happen because there is only one place in the tree for classifiers. However, classifiers for mass nouns are actually *n* heads making double classifier constructions with mass nouns possible, but still optional as the *n* head can move up to Clf.

All of this is wrapped up in the following tree, keeping in mind that classifiers like to hop up the tree.

(77)



6.1 Predictions

This theory, if true, does imply some testable hypotheses. In particular, it implies that double classifier constructions are possible with any mass noun. I obviously haven't tested every mass noun, but certainly more double classifier constructions are possible than initially identified by Ratliff (1991). Every mass noun I have tested has permitted a double classifier construction, but that doesn't rule out the possibility of an exception, and I haven't tested this thoroughly.

Furthermore, the claim that mensural classifiers in Hmong have a partition structure implies that Hmong mensural classifiers have rather limited syntactic and semantic possibilities. In particular, since they are not adjuncts like with the measure structure, we'd expect their order relative to other constituents to be fixed. I haven't found any instance of a mensural classifier being able to be put in a different order, but that again doesn't mean they never can be reordered. Additionally, mensural classifiers can behave semantically quite differently from sortal classifiers. Consider (78) shown below.

(78) Mary put four cups of water on the table. (Bale, Coon & Arcos López 2019)

Here *cup* can be interpreted either as a mensural classifier (measuring out the unit of a cup of liquid) or as a sortal classifier (indicating a literal cup filled with water). In the former case, this sentence is true no matter the container or containers the four cups of water are in as long as the total amount of water is four cups. This reading is called the *measure reading* by Bale, Coon & Arcos López (2019). In the latter case, the sentence is only true if exactly four literal cups are placed on the table, which is quite a bit more restrictive. This reading is called the *partition reading*. The difference between these readings is due to the difference between the partition and measure structures; see Bale, Coon & Arcos López (2019) for more details and discussion on the matter. The claim that mensural classifiers have a partition structure implies that they always have a partitioned reading as well.

This claim is quite strong. I have found one exception, namely *phaus* 'pound', but this is exceptional for a few reasons. In particular, it is a borrowing from English that my consultant didn't even recognize as a Hmong word until I pointed out that, according to the dictionary I was using, it meant 'pound'. *Phaus* 'pound' acting like the English word according to a bilingual Hmong-English speaker could very well be due to influence by English.

6.2 Avenues for Future Research

Hmong classifiers are very rich and complex, with many avenues for future research wide open. We have covered the syntax and semantics of Hmong classifiers fairly thoroughly in this thesis, but there's always room to nail out further details, particularly with respect to mass nouns and mensural classifiers, and always opportunities to compare my results with data from more speakers of varying ages and dialects. Additionally, the pragmatics of classifiers are very interesting and not discussed at all in this thesis. Riddle (1989) points out that definiteness in Hmong regarding classifiers is a lot more complicated than I've made it seem, and has more to do with referential salience than identifiability. Riddle manages to explain the discursive properties of classifiers quite thoroughly in narrative, but, as pointed out by White (2019), the discursive properties of classifiers in more natural speech are not well understood at all.

Leaving the domain of classifiers, Hmong syntax more broadly is very poorly understood. As Riddle points out in Riddle (1990) and Riddle (1994), Hmong syntax is very free. In particular, many structures that, in English, look very different but have very similar meanings look exactly the same in Hmong. This makes it difficult to tell what is going on, as one construction can correspond to different structures in different circumstances. Additionally, the Hmong verbal complex, like many other Southeast Asian languages, is very complex, with serial verbs, idiomatic auxiliary verbs, and lots of interesting stylistic and pragmatic conventions that are all difficult to formally model.

Abbreviations

3	third person
CLF	classifier
COMP	complementizer
COP	copula
DU	dual
INTS	intensifier
RECP	reciprocal

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