

Does Hmong Allow Noun Incorporation?

A Field Investigation

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1 Introduction and Background

Question

- Hmong includes a class of constructions consisting of an intransitive verb and a noun.
- In the best-known cases of this type, the verb is a stative psychological verb and the noun (often a body part) provides information about the location of the event.
 - (1) a. *nwg mob taubhau lawm*
3SG hurt head PERF
'He has a headache (hurts in the head) now.'
 - b. *nwg zoo sab lawm*
3G good liver PERF
'He's happy (good in the liver) now.'
- As pointed out by Clark (1996), these constructions have some characteristics in common with Type I noun incorporation (NI-I) Mithun (1984).
- Are these constructions instances of noun incorporation—lexical compounds, as Clark suggests—or syntactic phrases?

Claim

- The collocations that Clark has claimed to be instances of noun incorporation are actually syntactic phrases.
- These phrases are licensed by a zero-marked applicative operation that can be applied to any intransitive verb.
- Loosely comparable to various in English (valency alternations with no change in formal marking):
 - (2) Dative shift
 - a. Martha gave [the idea] to [me].
 - b. Martha gave [me] [the idea].
 - (3) Adjunct resultatives
 - a. [The vase] broke.
 - b. [I] broke [the vase].

1.1 The Hmong Language

The Hmong language in brief

- Originally from China, but spoken now in Vietnam, Laos, Thailand, Burma, and (via migration in the last four decades) the United States, France, French Guyana, Australia, etc.
- Not known to be related to any major language, but clearly related to a number of minority languages of Southern China and Southeast Asia.
- Typologically similar to Vietnamese (and to a lesser degree, Thai and Chinese).
 - Isolating morphology with rich inventory of compounds.
 - Verb medial syntax (SVO).
 - Numeral classifiers with nouns.

Hmong Dialect Issues

- As used here, *Hmong* refers to a single language, consisting of a variety of more-or-less mutually intelligible dialects.
- A great variety of Hmong dialects spoken in China.
- Several dialects spoken in Southeast Asia, but two overwhelmingly common:
 - Hmong Daw (White Hmong)
 - Mong Njua or Mong Leng (Green/Blue Hmong)
- These dialects differ in many phonological and lexical respects, but share substantially the same morphosyntactic properties.
- Clark's (1996) data from Hmong Daw.
- My data are from Mong Njua.

1.2 Hmong VNCs

Verb-Noun Collocations (VNCs)

- Collocations of transitive verbs and nouns are common across languages.
 - (4) English: *throw me a bone, shoot the breeze, kill time*
 - (5) Hmong:
 - a. *nrum pob*
throw ball
'play the ball game (courting ritual)'
 - b. *tua neev*
kill crossbow
'shoot a crossbow'
- Sometimes have idiomatic semantics.
- Nouns are prototypical objects: patients, themes, stimuli.

Intransitive-Verb VNCs in Hmong

In Hmong, there are many collocations consisting of an intransitive verb + noun.

A Few Examples

<i>tu</i>	'be broken'	<i>sav</i>	'life'	<i>tu sav</i>	'die'
<i>tu</i>	'be broken'	<i>sab</i>	'liver'	<i>tu sab</i>	'be offended'
<i>luv</i>	'be snapped'	<i>teg</i>	'arm'	<i>luv teg</i>	'be broken-armed'
<i>dlub</i>	'black'	<i>muag</i>	'face'	<i>dlub muag</i>	'aloof'
<i>khv</i>	'suffer'	<i>nyaj</i>	'money'	<i>khv nyaj</i>	'work for money'
<i>moog</i>	'go'	<i>kuataw</i>	'foot'	<i>moog kuataw</i>	'go by foot'
<i>qeg</i>	'be low'	<i>taub</i>	'head'	<i>qeg taub</i>	'be short'
<i>qaug</i>	'stumble'	<i>cawv</i>	'liquor'	<i>qaug cawv</i>	'be drunk'
<i>caj</i>	'be alive'	<i>vaaj</i>	'king'	<i>caj vaaj</i>	'become a king'
<i>dlo</i>	'be smooth'	<i>hau</i>	'head'	<i>dlo hau</i>	'bald-headed'

What is the Relationship between the Noun and the Event?

- Clark (1996) concentrates on one kind of relationship between noun and event:
 - The whole construction refers to a psychological state.
 - The noun denotes the location in the body of the experiencer where the state is experienced (literally or metaphorically).
- However, the list above shows that the same type of syntactic relationship can encode a wide variety of semantic relationships:
 - The (literal or figurative) location of a physical characteristic, injury, or insult.
 - The cause, motivation, or goal of an event.
 - The means or instrument by which an event is carried out or a path is traversed.
 - A participant that accompanies the actor in the event.
- Not unlike the class of arguments that can be added in APPLICATIVE constructions.

1.3 VNCs as Type I Noun Incorporation

The Case for NI in Hmong

- The nouns in Hmong VNCs are different from prototypical objects.
 - More likely to provide information about the MANNER of the event than to refer to the UNDERGOER of the event.
 - Usually seem to receive an indefinite, generic interpretation.
- Likewise, the verb these VNCs are not prototypical transitive verbs.
 - Many are stative ('be short', 'be smooth', 'be broken')
 - Others refer to activities with only one participant ('go', 'suffer', 'stumble')
- Furthermore, VNCs are word-like in a number of respects:
 - They may serve as the domain for tone sandhi (*poob-dlej* → *poob-dleg* 'be_lost-water') which is usually confined compounds (but cf. also NUM + CLF).
 - They often have somewhat idiomatic semantics.
 - Some have become highly LEXICALIZED (e.g. *txaaj muag* 'avert eye' to the extent that speakers cannot easily analyze them into their component parts.
 - As Clark (1996) points out, the association between the noun and verb is very close, with the noun referring to some aspect of the predicate, rather than an external entity.
- Clark's specific hypothesis involves the promotion of possessors to subject:
 1. The actual experiencer of a psychological event is (literally or metaphorically) a body part.

2. This body part has a possessor.
3. VNCs formed when the experiencer is incorporated into the verb and the subject is promoted to subject.

- (6) a. *kuv lub taubhau mob*
 1SG CLF head hurt
 ‘My head hurts.’
- b. *kuv mob tauhau*
 1SG hurt head
 ‘I head-hurt.’

1.4 Problems

Problems for Clark’s hypothesis

- Not all Ns collocated with intransitive verbs are locations.
- Not all Ns collocated with intransitive verbs are possessed by the subject of the clause.
- Not all intransitive Vs so collocated are stative or psychological.

- (7) a. *Nwg txawj dhla qeej*
 3SG able leap lusheng
 ‘He can lusheng dance’
- b. *dlha* ‘to jump, to dance, to run’
- c. *dlha qeej* ‘dance with a lusheng’

- (Clark 1996:541) acknowledges that Hmong allows constructions like VNCs, but with syntactically complex complements:

- (8) a. *kuv paub hais tias nyuab-nyuab [koj siab] kawg...*
 1SG know say that be_trouble-be_trouble 2SG liver extreme
 ‘I know that it is a great worry to you.’
- b. *poj-niam me-nyuam khuam [yus siab] hwm.*
 wife children caught IMP.SG liver very_much
 ‘One misses one’s wife and children very much.’

- However, she suggests that these sentences do occur *with* possessor promotion and that they represent a fundamentally different construction.
- Some text data suggests that syntactically complex INs can occur even with possessor promotion.

2 Study

2.1 Questions

Questions

- An examination of text data and earlier field notes raises some questions regarding the hypothesis that Hmong VNCs involve noun incorporation:
- Is there a restriction on “incorporation” of syntactically complex complements?
 - Nouns with modifiers?
 - Nouns with possessors?

- Nouns with quantifiers?
- Only nouns whose referent is possessed by the referent of the subject?
- Can incorporated nominals be referential?
- Can incorporated nominals be anaphoric pronouns?

Syntactic Complexity

- Traditionally, noun incorporation has been seen as the sacred union of one noun and one verb.
 - MORPHOLOGICAL VIEW: it is purely morphological process that occurs in the lexicon.
 - SYNTACTIC VIEW: it involves the merger of an N^0 with a V^0 to form a V^0 .
 - By either definition, the nominal constituent must be syntactically simple.
- The apparent incorporation of a syntactic phrase (e.g. an NP) into a verb is known as PSEUDO-INCORPORATION or QUASI-INCORPORATION (Booij 2009; Massam 2001).
- It probably represents a phenomenon distinct from NI.

Referentiality

- If VNCs in Hmong are instances of NI-I, we expect them to act like lexical compounds (and thus like single words).
- One purported property of words is that they obey the LEXICAL INTEGRITY PRINCIPLE
 - The syntax does not manipulate the internal structure of words.
 - The syntax does not have access to the internal structure of words.
- For our purposes, this means that pronouns should not be able to refer to part of a compound word.
 - (9) a. We opened [three bottles of wine_i]_{DP} and it_i tasted foul.
 - b. *We opened three [wine_i bottles]_N and it_i tasted foul.

Incorporated Pronouns

- If Hmong VNCs are instances of NI-I, we expect strong selectional restrictions on what types of syntactic entities can be “incorporated”.
- Can the N in VNCs ever be replaced by a pronoun?
- Hmong has a type of reflexive pronoun that is realized formally as a copy of its antecedent (Boeckx et al. 2009, 2010; Mortensen 2004).
 - (10) a. *Koj_i xob qhuas koj_i nawb!*
 2SG NEG.IRR praise REFL EMPH
 ‘Don’t praise yourself!’
 - b. *Pov_i tsi tau qhuas Pov_i ib zag.*
 PAO NEG ACHIEVED praise REFL one time
 ‘Pao didn’t praise himself once.’
- Although a range of analyses are possible, if nouns in VNCs can be freely replaced by such anaphors it would be difficult to reconcile that fact with an analysis that treated VNCs as lexical items.

2.2 Methodology

Instrument

- To maintain consistency in data collection, a standardized instrument was developed.
- The instrument was designed around VNCs attested in texts, dictionaries, and prior field notes.
 - Each section started with a sentence containing a known VNC.
 - Subsequent items in the section were derived from this first sentence by modifying it in systematic ways:
 - * IN = PRO + CLF + N
 - * IN = CLF + N
 - * IN = PRO + N
 - * IN = N + modifier
 - * IN = quantifier + CLF + N
 - * VNC place in frame where N could bind null pronoun.
- An additional section contained VNCs where the N was replaced by a copy reflexive.

Instrument

- (11)
- | | |
|--|---|
| a. <i>nwg dlha kev lawm</i>
3SG leap road PERF
'He runs (the road).' | e. <i>nwg dlha txuj kev lawm</i>
2SG leap CLF road PERF |
| b. <i>dlha nwg txuj kev</i>
leap 3SG CLF road | f. <i>nwg dlha ib txuj kev lawm</i>
3SG leap one CLF road PERF |
| c. <i>dlha nwg kev lawm</i>
leap 3SG road PERF | g. <i>Yug txawm dlha kev npaum le caag los pro</i>
IMP.SG though leap road as_much as how even |
| d. <i>nwg dlha kev lawm</i>
3SG leap road PERF | <i>yeej tsi pob</i>
always NEG be_ruined |

Participants

- Participants in my study were speakers of Hmong Njua (Mong Leng or Green Hmong) living in Chiang Mai Province, Thailand.
 - 15 individuals
 - 2 were from Phayao Province in northeastern Thailand and resided in Chiang Mai city; the remainder lived in rural villages in or near Doi Suthep-Doi Pui National Park.
 - **Gender:** 6 female; 9 male.
 - **Age:** from 33 to 82.
 - **Multilingualism:** all but 2 reported being able to speak (Northern) Thai as well as Hmong.
 - **Literacy:** 5 reported being able to read Thai; 2 of these were also literate in Hmong; 2 were literate in Hmong but not Thai; the rest reported no literacy in any language.
- Participants were compensated for their participation at the rate of 100 Thai Baht per hour; interviews lasted between 3 and 6 hours.
- Recruited with the help of a local contact who also provided transportation.

Interviews

- **Setting:** Interviews were typically conducted in the home of the participant.
- **Language:** Hmong Njua was used as the medium of instruction and elicitation.

- **Recording** All interviews were recorded as uncompressed tracks with a Sony MZ-RH1 Hi-MD recorder and Shure SM10A head-mount microphone.
- **Instruction** A Thai Hmong assistant accompanied me to all interviews. This assistant explained the elicitation procedure, the reason for using recording equipment, etc. The assistant took special care to make sure participants knew that certain of the phrases they would hear would be ungrammatical and that they should not hesitate to identify them as such.

Format of Questions

1. I read the prompt to the participant.
2. I asked the participant whether the prompt was grammatical (correct, something that a native Hmong speaker could say) or whether the words were in the wrong order.
3. If they responded that it was not, I probed to make sure that the motivation for the judgment was grammatical rather than pragmatic. *Very difficult.*
4. If they responded that it was, I asked them to explain what the utterance would mean and in what context it could be used. Where appropriate, they were asked to compare the meaning of the prompt to earlier prompts in the same section.

Coding of Prompts

- Classes of VNCs were coded according to various criteria in order to identify possible grammatical and semantic factors in participants responses.
- Event type classifications:
 - Psychological versus non-psychological
 - Equative versus non-equative
 - Telic versus atelic
 - Durative versus punctual
 - Stative versus active
- Properties of nominals
 - Possessed by subject
 - Inherently possessed by subject
 - Body part
 - Location

Coding of Data

- For each subject, each prompt was coded for grammatically, pragmatic felicity, and meaning.
- Because it was decided that scalar rating of grammatically was too difficult in the particular cultural context, grammatically was treated as a binary distinction.
- Felicity was also coded on a binary basis.
- Different semantic items were coded depending on the prompt type:
 - Referential and non-referential readings for Ns in VNCs
 - Scope of modification for Ns with modifiers

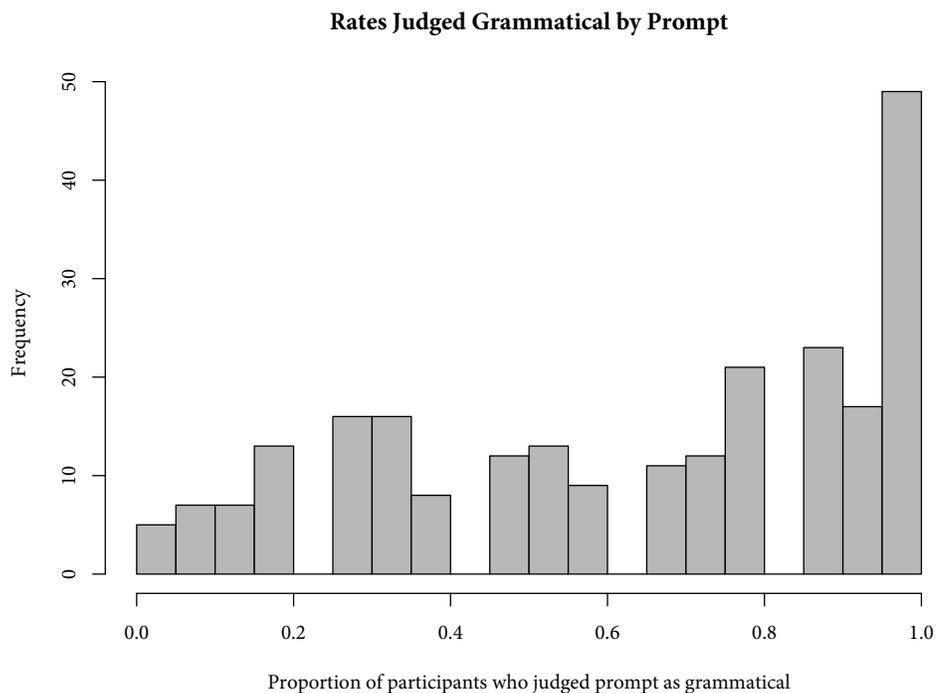
Analysis

- Data was subjected to both qualitative and quantitative analysis.
- Qualitative analysis according to traditional criteria in descriptive and theoretical linguistics.
- Multiple quantitative analysis.
 - Attempt to distinguish grammaticality effects from “elicitation noise.”
 - Attempt to discern causes of variation in the data.
- Qualitative analysis most important for the current study.

2.3 Results

Grammaticality by Prompt

- 65% of sentences were judged by speakers to be grammatical.
- Moderate agreement among participants (Fleiss's $\kappa = 0.38$).
- A substantial subset of items (49/249) were agreed to be grammatical by all participants.



Grammaticality by Type

- As might be expected, the sentence types varied in acceptability when taken as groups.
 - IN = N (93%)
 - VNC placed in frame where N could bind null pronoun. (90%)
 - IN = N + modifier (75%)
 - IN = quantifier + CLF + N (63%)
 - IN = CLF + N (59%)
 - IN = PRO + CLF + N (46%)
 - IN = PRO + N (41%)
- However, at least some prompts of each type were judged to be grammatical by all participants.

Modified INs

- Sentences where the IN consisted of a noun plus a modifier (compounded noun or stative verb) which were accepted by all participants included the following:

- (12) a. *nwg tuaj kub ntev lawm*
3SG come_out horn long PERF
'He has long horns.'
- b. *nwg luv saab cig xis lawm*
3SG be_broken CLF leg right PERF
'His right leg is broken (he is right-foot-broken).'
- c. *nwg poob dlej tub lawm*
3SG lost water deep PERF
'He fell in deep water.'

Quantified INs

- (13) Sentences accepted by all participants included the following examples where IN includes a quantifying expression:
- a. *nwg mob ib saab taubhau xwb*
3SG hurt one CLF head just
'He hurts on just one side of his head.'
- b. *nwg luv ib saab cig lawm*
3SG be_broken one CLF leg PERF
'He has broken his leg on one side.'
- c. *nwg poob ob hub nyaj lawm*
3SG lost two pot silver PERF
'He has lost two pots of silver/money.'

Possessed INs

- All participants also accepted the following sentences where IN includes a possessor and a classifier and there is no overt subject:

- (14) a. *zoo nwg lub sab lawm*
be_good 3SG CLF liver PERF
'He is happy now.' 'It makes him happy now.'
- b. *mob nwg lub taubhau*
hurt 3SG CLF head
'His head hurts.' 'It gives him a headache now.'
- c. *taag nwg lub sijhawm*
be_exhausted 3SG CLF time
'His time is up.' 'It's a waste of his time.'

- Similar to Clark's examples of syntactically complex complements.
- Semantically ambiguous: allow both stative and resultative readings.

Possessed INs without CLF

- Normally, possessed nouns in Hmong are marked with a classifier.
- Classifiers may be omitted in cases of inalienable possession (body parts, some kinship terms).
- Items accepted by speakers in this study tended to follow those constraints:

- (15) a. *zoo nwg sab lawm*
be_good 3SG liver PERF
'He's happy now.'
- b. *txaus nwg sab lawm*
be_enough 3SG liver PERF
'He's satisfied now.'

Statistical Analysis of Variation: Syntactically Complex INs

- Factors contributing to grammaticality judgments for prompts with syntactically complex INs were examined using Rbrul, a tool for performing multiple regression on linguistic data for the statistics package R.
- With all types included, best predictors of grammaticality were:
 - psychological event (emotion, sensation) (p=0.00649)
 - telic event (has an inherent endpoint) (p=0.042)
- However, there is reason to believe that grammaticality judgments for INs with quantifiers was deflated because of pragmatic problems with quantifying, e.g. loci of emotion.
- When these are excluded, the best model found was one including only whether the event referred to was psychological. (p=0.000187)

Binding Null Pronouns

- A wide range of examples show that Ns in VNCs can bind null pronouns.
- The following sentences were judged grammatical by all consultants and allowed a referential reading for the IN by at least 73% of participants.

- (16) a. *nwg txawm poob plig_i los pro_i yeej yuav rov qaab lug*
3SG thus lost spirit even always will return back come.
'Even if he has spirit_i-lost, it_i will certainly return.'
- b. *nwg txawm moog kuataw_i npaum le caag los pro_i yeej tsi puag*
3SG thus go foot as_much as how even always NEG ruined
'No matter how much he foot_i-goes (walks), they_i will certainly not be ruined.'
- c. *nwg txawm luv cig_i lawm los mom yeej khu tau pro_i*
3SG thus be_broken leg PERF even doctor always repair can
'Even if he's now leg_i-broken, the doctor could certain fix it_i.'
- d. *nwg txawm dlha qeej_i npaum le caag los pro_i yeej tsi puag*
3SG thus leap lusheng as_much as how even always NEG ruined
'No matter how much he lusheng_i-dances, it_i will certainly not be ruined.'

Copy reflexives

- Most copy-reflexive examples were accepted by an overwhelming number of participants.
- Reflexive either interpreted as cause or concomitant.

- (17) a. Nwg_i moog nwg_i xwb. 3SG go REFL just
 ‘He went alone.’ ‘He went of his own volition.’
 b. Nwg_i zoo nwg_i xwb. 3SG be_{GOOD} REFL just
 ‘He is well-off alone (doesn’t share).’ ‘He recovered of his own accord.’ ‘He’s like that of his own accord.’

3 Discussion

3.1 Ns in Hmong VNCs are \geq NPs

When are Syntactically Complex INs Allowed?

- While many participants accepted a variety of prompts with syntactically complex INs, they were most widely accepted under two conditions:
- In expressions encoding PSYCHOLOGICAL events.
- In expressions encoding TELIC events (events with an inherent endpoint).

Noun Phrase “Incorporation”

- Syntactically complex INs occur even in cases *with* “possessor raising” and syntactically simple INs occur in cases without “possessor raising.”
- The expressions encoding psychological events that are highlighted by Clark are actually the most likely to admit syntactically complex INs.
- This works against the idea that VNCs are NI-I in two ways:
 - INs in noun incorporation should consist of a single N⁰ that is compounded with a V⁰.
 - Incorporated nouns in NI-I should be non-specific and non-referential.
 - However, complex INs may include noun classifiers, quantifiers, or possessors, any of which *imply specificity*.
- This raises a different question:
 - Could VNCs with bare-noun INs be, despite their superficial resemblance to those with complex INs, represent a different morphosyntactic construction?
 - If so, are INs in these constructions construed as specific or generic?

3.2 Ns in Hmong VNCs can be specific and referential

Bare nouns in VNCs can bind pronouns

- The fact that NIs in VNCs—even when they consist of bare nouns—can bind pronouns is problematic for the claim that VNCs are verbs with noun-incorporation or some other type of lexical compound.
- Lexical Integrity—syntax should not be able to reference internal structure of words.
- Even if one rejects lexical integrity, it is generally the case that:
 - Nominal non-heads in compounds denote properties rather than entities.
 - Incorporated nouns receive a generic, rather than specific, interpretation.
- It is apparent that Ns in VNCs may denote properties and receive a generic interpretation.
- *But one surprising fact revealed by this study: referential, specific interpretations of these Ns are possible.*

3.3 Ns in Hmong VNCs as applicative arguments

“Transitive” Verbs in Hmong

- A body of research by Jarkey (2004, 2010a,b) suggests that “transitive” verbs in Hmong are not as transitive as one might expect from their English glosses.
- For verbs which take two arguments, the second (“object”) argument must be involved in the event encoded by the verb, but is not necessarily *affected by* (a PATIENT in) the event.
- The effect of an event on such a participant is encoded through addition verbs showing, e.g. the result state of the event.

(18) a. *puab tua nwg tuag.*

3PL kill 3SG die

‘They killed him dead.’ or ‘They shot him dead.’

b. *puab tua nwg kuas nwg tsi tuag.*

3PL kill 3SG but 3SG NEG die

‘They shot/attacked him but he didn’t die.’ (Literally: ‘They killed him but he didn’t die.’)

- This makes it hard to talk about AGENTS and PATIENTS in the context of individual verbs; one has to talk about whole clauses (and whole events).
- Upshot: the Ns in VNCs are not so different from the objects of transitive verbs: for both cases, participation in the event is encoded but no more specific role is specified.

Proposal

- Hmong grammar licenses a formally unmarked valency-increasing operation on intransitive (monovalent) verbs converting them into bivalent verbs.
 - I view it as occurring in the lexicon, for theory-internal reasons.
 - Could just as easily be viewed as occurring in the syntax, depending on one’s theoretical preconceptions.
- This added argument is a participant in the encoded event, but is not a patient.
- In this respect, verbs resulting from this operation are no different from other bivalent (“transitive”) verbs in Hmong.

Proposal

- On the other hand, there are clearly IDIOMATIC associations between particular Vs and Ns in VNCs.
- Explanation: Some VNCs are *lexicalized expressions* but they are not *generated* in the lexicon.
- In general, the compound-like properties of VNCs derive from ENCYCLOPEDIA KNOWLEDGE:
 - Knowledge about idiomatic semantics associated with verb-noun pairs.
 - Knowledge about the real world and culture-internal conceptions of the world.

4 Conclusion

Take-home messages

- Structured parallel interviews can be a useful methodological supplement to more traditional types of field work.
 - Forces the linguist to confront the degree to which informant responses to grammaticality/felicity tasks can vary.

- Invites the linguist to address the causes of this variation.
- Makes it easier to distinguish relatively uncontroversial examples from more controversial ones.
- There are compelling reasons to believe that Hmong VNCs are not cases of noun incorporation:
 - INs can be syntactically complex, even without possessor promotion.
 - INs can be specific.
 - INs can be referential.
 - INs can be copy anaphors.
 - These facts can be accounted for by a generalized valency-increasing operation that can apply to intransitive verbs.

Further questions: relation of Hmong VNCs to NI

- Hmong VNCs referring to psychological events are remarkably similar to “psycho-collocations” in other Southeast Asian languages.
- In some of these languages, psycho-collocations *do* have seem to have many of the properties that we expect of noun incorporation.

(19) Example from Huishu (Tangkhulic; Tibeto-Burman; Sino-Tibetan)

- a. *k^hə- ni ni- kə- k^hə*
 PFX- ear ear NOM deaf
 ‘deaf (lit. ear ear-deafness)’
- b. IN is stripped of lexical prefix.
- c. Gets generic reading.
- d. Clearly compounded with verb.

- Is there some grammatical relationship (e.g. as part of a diachronic pathway) that true NI psycho-collocations to Hmong VNCs?
- (One can imagine the generalization of a noun-incorporation construction to the applicative-like construction in Hmong, or the emergence of noun-incorporation as the total lexicalization of VNCs).
- Or is the relationship purely a conceptual one, which is encoded in two or more completely distinct grammatical constructions?

Further questions: explaining variation

- Participants showed considerable variation in the responses.
- Certain participants seemed to show systematic patterns of variation.
- It remains to be seen whether some of this variation can be accounted for in terms of sociolinguistic (and other) facts about the participants.
- Data relevant to this question was also collected, but analysis is not yet complete.

Further questions: prosody

- If the V-N sequences in VNCs are basically the same, morphosyntactically, as sequences of a transitive verb and its object, they should also have the same prosodic structure (other things being equal):
 - No systematic difference in duration.
 - No systematic differences in amplitude.
 - Comparable pitch contours for identical tone sequences.
- Data has been collected to test this prediction, but it has not yet been analyzed.

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