Negation in Nanti: Syntactic evidence for head and dependent negators

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Abstract

In this paper we argue that, despite a lack of morphological markers on its negators, Nanti shows syntactic evidence for two negation strategies in the main clause: head negation and modifier negation. The head negator motivates the construction of a hierarchy of forms, and the interaction of the main clause negators motivates an additional HEAD feature. We then extend the analysis to a previously unconsidered negator in the language. Finally, our analysis is implemented and tested in a grammar based on the LinGO Grammar Matrix.

1   Introduction

This paper examines and presents an analysis of negators and their interaction in Nanti [ISO 693-3 code: cox], a Kampan-branch Arawakan language spoken in Peru. We argue that Nanti uses two different negation strategies among three negators. Our work also serves as an illustration of identifying head versus dependent negators without the help of morphological distinctions. We first begin with background and motivation for the analysis, followed by the data and analysis itself, and finally typological implications.

This also is an example of hypothesis testing through grammar engineering (Bender, 2008). We implemented a small, functional grammar fragment for Nanti as part of a course taught by Emily Bender at the University of Washington (Bender, 2007), and the grammar includes the negation analysis presented here. The grammar was developed from the LinGO Grammar Matrix customization system (Bender et al., 2002, 2010), followed by manual modification and expansion by the authors. We developed a testsuite of 206 sentences, 118 grammatical and 88 ungrammatical. Of these, 33 deal with negation, and so are of immediate relevance to the current paper. Both the testsuite and the grammar are publicly available for download at `https://github.com/faiuwle/Nanti`.

2   Motivation

Lev Michael describes the negation system in Nanti as consisting of a pair of internal negators and an external negator (Michael, 2008, 2014b). The internal negators *tera* and *hara* are described as having basic semantic negation properties, as well as forcing an alternation of verbal mood. The external negator *matsi* is semantically a metalinguistic negator (Michael, 2014b). All negators take scope over clauses, and it is possible for an internal and external negator to cooccur, but only with a particular ordering. While the distribution is well-described, the reasons for it remain elusive, at least within Michael's grammar. We propose that an HPSG analysis of the negators as auxiliaries and modifiers captures these distribution patterns.

3   Data

Nanti employs the following negation strategies: the metalinguistic negator *matsi*, the descriptive negators *tera* and *hara* (with reduced clitic forms *te* and

ha), existential negation, and exhaustive negation (Michael, 2014b). We focus on the descriptive and metalinguistic negators. The data presented in this section is all taken from Michael 2014b.

Both metalinguistic *matsi* and the descriptive negators *tera* and *hara* appear to the left of the verb and its arguments (excepting any in the initial topic position), as seen in examples (1) and (2):

(1) *Matsi nopakeri maika peremisa.*

matsi   no=p-ak-e=ri   maika peremisa
NEG.META 1S=give-PERF-REAL.I=3MO now   permission

'It is not the case that I gave him permission at that time.' [cox] (Michael, 2014b, p.194)

(2) *Tera imporohe.*

tera   i=N-poroh-e
NEG.REAL 3MS=IRREAL-clear.land-IRREAL.I

'He is not clearing land.' [cox] (Michael, 2014b, p.188)

The difference between *tera* and *hara* lies in their interaction with the Nanti mood system, a binary realis/irrealis system (called reality status in the literature), which is used, among other things, to distinguish future events from non-future ones (Michael, 2014a). *Tera* is used only with notionally realis (non-future) clauses, while *hara* is used only with notionally irrealis ones (Michael, 2008). Nevertheless, *tera* requires its clauses to be irrealis-marked, and *hara* requires its to be realis-marked. Michael 2014b refers to these latter as "doubly irrealis" clauses, with the negation adding an extra element of irrealis.

(3) a. *Opoki.*
         o=pok-∅-i
         3NMS=come-IMPF-REAL.I

         'She is coming.' [cox] (Michael, 2014b, p.190)

     b. *Tera ompoke.*
         tera   o=N-pok-e
         NEG.REAL 3NMS=IRREAL-come-IRREAL.I

         'She did not come.' [cox] (Michael, 2014b, p.191)

(4) a. *Ompoke.*
         o=N-pok-∅-e
         3NMS=IRREAL-come-IMPF-IRREAL.I

         'She will come.' [cox] (Michael, 2014b, p.191)

     b. *Hara opoki.*
         hara   o=pok-i
         NEG.IRREAL 3NMS=come-REAL.I

         'She will not come.' [cox] (Michael, 2014b, p.191)

Tera and *hara* also prohibit aspect marking in Nanti, which is otherwise obligatory on verbs, either as the perfective *-ak* suffix as in (5b) or as the null imperfective suffix as in (5a).

(5) a. *Inihi.*

   i=nih-∅-i
   3MS=speak-IMPF-REAL.I

   'He was speaking.' [cox] (Michael, 2014b, p.193)

   b. *Inihake.*[1]

   i=nih-ak-i
   3MS=speak-PERF-REAL.I

   'He spoke.' [cox] (Michael, 2014b, p.193)

(6) a. *Hara inihi.*

   hara   i=nih-i
   NEG.IRREAL 3MS=speak-REAL.I

   'He will not speak.' [cox] (Michael, 2014b, p.193)

   b. **Hara inihake.*

   hara   i=nih-ak-i
   NEG.IRREAL 3MS=speak-PERF-REAL.I

   *'He will not speak.' [cox] (Michael, 2014b, p.193)

It is also possible for *tera* or *hara* to follow *matsi* to create a doubly negated clause as in (7), but it is not possible for any negator to follow *tera* or *hara*.

(7) *Matsi te pishinetemparo oka.*

   matsi   te   pi=N-shine-eNpa=ro   o-oka
   NEG.META NEG.REAL 2S=IRREAL-like-IRREAL.A=3NMO 3NM-this

   'It is not the case that you don't like this.' [cox] (Michael, 2014b, p.195)

Another negator, which we were not aware of during our initial analysis, is the "exhaustive" negator *mameri*, used to indicate that the state of the clause is not realized even to the smallest degree, as in (8). Like *tera*, *mameri* applies only to notionally realis clauses with irrealis marking, and does not allow the verb to take aspect marking (Michael, 2014b). Because of these commonalities, our analysis for *tera* also works for *mameri*.

(8) *Mameri inehakotero saburi, kotsiro.*

   mameri i=N-nehako-e=ro   saburi
   NEG.EX 3MS=IRREAL-be.familiar.with-IRREAL.I=3NMO machete
   kotsiro
   knife

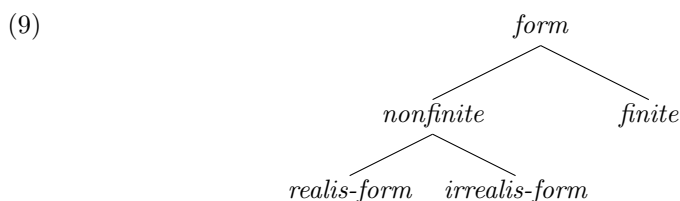   'He had no familiarity with machetes or knives at all.' [cox] (Michael, 2014b, p.198)

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[1] As noted in Michael 2014b, the realis and irrealis suffixes for *-i* verbs are neutralized after perfective *-ak*.

In summary, *tera* takes notionally realis clauses while *hara* takes notionally irrealis ones, and *matsi* can take either. The descriptive negators *tera* and *hara* require clauses to take on the opposite reality status marking to their notional/semantic value, and while *matsi* can be followed by a descriptive negator, the descriptive negators cannot be followed by other negators. Additionally, there is an exhaustive negator *mameri*, which behaves like *tera*.

4 Analysis

The challenge for the analysis is to capture the phenomena described above within the HPSG framework, with well-motivated rule sets and feature geometries that generate and parse grammatical examples, while failing to generate ungrammatical examples. To this end, we use the Grammar Matrix system (Bender et al., 2002, 2010) as an implementation tool to fully test our analyses.[2] The two chief phenomena to address are: the TAM restrictions for dependent clauses of the descriptive negators *tera* and *hara* (examples 3–6); and the ordering restriction that *matsi* must precede *tera* or *hara* (example (7)).

The clauses following the descriptive negators *tera* and *hara* exhibit two restrictions: they cannot take aspect marking (6b), and they exhibit mood-marking inversion (that is, their syntactic mood-marking is the opposite of their semantic mood). However, *tera* and *hara* themselves do not take morphological marking. In terms of head features (as described comprehensively in Zwicky 1985), the descriptive negators cannot be easily defined as morphosyntactic loci (since they have no morphology themselves), but are clearly governing the following sentential complement by restricting the morphological shape of its head verb. Zwicky cites this governing pattern as sufficient to analyze English auxiliaries as heads, and we agree and apply the same reasoning to Nanti. We analyze the descriptive negators *tera* and *hara* as heads, and further analyze their aspectless, mood-inverted complements as nonfinite sentences (necessarily headed by nonfinite verbs) governed by the negator. We accordingly define nonfinite FORMs for these verbs, in the following type hierarchy:

(9)

$$
\begin{array}{c}
form \\
\diagdown \\
nonfinite \qquad finite \\
\diagdown \\
realis\text{-}form \quad irrealis\text{-}form
\end{array}
$$

Form serves as a general type for the FORM value on HEAD[3], with daughters *finite* and *nonfinite*, and *nonfinite* leaves *realis-form* and *irrealis-form* representing nonfinite verb forms with the respective realis or irrealis morphology. This use of the FORM feature on HEAD is necessary to ensure that the analysis of the negation interacts correctly with other analyses, namely that all verbs in Nanti not negated with descriptive negators require both aspect and mood

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[2]The feature geometry shown in this paper is that of the implemented grammar, which is based on the Grammar Matrix.

[3]While it may seem strange to have a feature which relates to mood in HEAD rather than somewhere in CONT, this is necessary to effect the "mood reversal" triggered by the descriptive negators without changing the notional (semantic) information in the MRS itself.

marking. We require [FORM *finite*] for the root node, and all [FORM *finite*] verbs are required to be marked for both aspect and mood. This is handled by a system of flags (see Goodman 2013) which require all verb lexemes to go through lexical rules corresponding with morphological positions for aspect and mood marking. There are two sets of these rules: the ones which require the verb to be [FORM *finite*] and the ones which require [FORM *nonfinite*] or one of its daughter types. The former apply both aspect and mood markings as usual (with the realis morphology matched to [E.MOOD *realis*] verbs and irrealis morphology attached to [E.MOOD *irrealis*] verbs). The latter do not apply aspect, and assign a FORM value rather than an E.MOOD value, leaving the actual application of mood for later in the unification process. Resultingly, morphological forms can be assigned with their opposite E.MOOD values, so long as the verbs are [FORM *nonfinite*]. These morphologically "mismatched" verbs can then be selected appropriately as complements of the negators *tera* and *hara*, thanks to the FORM values. The type hierarchies for the lexical rules are presented in examples (10) and (11), with infinitive-lex-rule, u-realis-lex-rule, and u-irrealis-lex-rule assigning non-finite FORM values and not assigning E.ASPECT or E.MOOD values (hence "u" for "unspecified"), letting *tera* and *hara* constrain the mood of their complements appropriately.[4]

(10)

aspect-lex-rule

imperfective-lex-rule   perfective-lex-rule   infinitive-lex-rule

(11)

mood-lex-rule

realis-lex-rule   irrealis-lex-rule   u-realis-lex-rule   u-irrealis-lex-rule
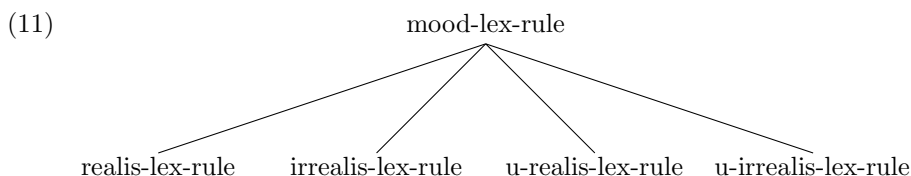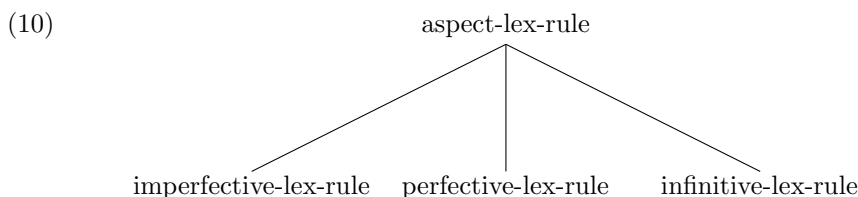
With the non-finite complements and their associated sections of the type hierarchy worked out, we return to *tera* and *hara*. Taking the above conclusion that these are heads selecting for sentential complements, we turn to the question of what kind of head they are. One candidate is that these are auxiliary verbs, since they are taking a verbal (sentential) complement. The descriptive negators lack lexical meaning, only contributing grammatical function (negation) to the clause, and *tera* and *hara* also undergo phonological reduction to their respective clitic forms *te* and *ha*, both qualities shared with many auxiliary constructions (Anderson, 2006). We take these factors as sufficient to posit an analysis of *tera* and *hara* as defective auxiliary verbs. These auxiliaries specify the FORM values *realis-form* or *irrealis-form* on their complements as described in the above paragraph. We introduce the boolean value HEAD.AUX to distinguish these negators from other verbs, and also to prohibit auxiliaries from taking verbal morphology.[5] Finally we introduce a boolean feature HEAD.NEGATED

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[4]The actual names of the lexical rules are slightly different here than in the TDL code, so as to perserve formatting.

[5]To prohibit or permit particular morphology on particular lexemes, we make use of a

to keep track of negation in the syntax. The NEGATED feature allows the syntax to distinguish between the grammatical negation *matsi te* and ungrammatical *te matsi*, by specifying that the descriptive negators must take a non-negated complement. These common properties are shared in a common supertype for *tera* and *hara*, which we have termed *neg-aux-lex* (12).

(12)
$$
\begin{bmatrix}
neg\text{-}aux\text{-}lex \\[4pt]
\text{SYNSEM...CAT}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
verb \\
\text{AUX} & + \\
\text{NEGATED} & +
\end{bmatrix} \\[12pt]
\text{VAL.COMPS}
\left\langle
\begin{bmatrix}
\text{LOCAL.CAT}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
verb \\
\text{FORM} & nonfinite \\
\text{NEGATED} & -
\end{bmatrix} \\[12pt]
\text{VAL}
\begin{bmatrix}
\text{SPR} & null \\
\text{COMPS} & null
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix} \\[6pt]
\text{INFLECTED} \quad infl\text{-}satisfied
\end{bmatrix}
$$

The individual negators *tera* and *hara* inherit from the constraints specified in (12), with the following additions defining their particular types of mood-marking inversion:

(13) a.
$$
\begin{bmatrix}
neg\text{-}notionally\text{-}realis\text{-}aux\text{-}lex \\[4pt]
\text{STEM} \quad \left\langle \text{"tera"} \right\rangle \\[6pt]
\text{SYNSEM...COMPS} \quad \left\langle
\begin{bmatrix}
\text{LOCAL} &
\begin{bmatrix}
\text{CONT...E.MOOD} & realis \\
\text{CAT.HEAD.FORM} & irrealis\text{-}form
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix}
$$

b.
$$
\begin{bmatrix}
neg\text{-}notionally\text{-}irrealis\text{-}aux\text{-}lex \\[4pt]
\text{STEM} \quad \left\langle \text{"hara"} \right\rangle \\[6pt]
\text{SYNSEM...COMPS} \quad \left\langle
\begin{bmatrix}
\text{LOCAL} &
\begin{bmatrix}
\text{CONT...E.MOOD} & irrealis \\
\text{CAT.HEAD.FORM} & realis\text{-}form
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix}
$$

Thus, when all the lexical rules and constraints from negators are applied, we have the following analysis for the verbs from example (3), excluding irrelevant parts of the feature structures, such as the PNG values associated with the subject:

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structure called INFLECTED introduced via the Grammar Matrix. INFLECTED contains a number of flags indicating which lexical rules a lexeme has gone through, and a special type [INFLECTED *infl-satisfied*] indicates a fully-inflected form. We give the descriptive negators an INFLECTED value of *infl-satisfied* (to permit them to enter into the syntax as fully-formed words), and specify [AUX −] on all lexical rules in the verbal morphology (to prevent these negators from acquiring verbal morphology). For a fuller discussion of the role of INFLECTED features, see Goodman 2013.

(14) a.

$$
\begin{bmatrix}
word \\
\text{STEM} \quad \left\langle \text{``opoki''} \right\rangle \\
\text{CAT} \quad
\begin{bmatrix}
\text{HEAD} \quad
\begin{bmatrix}
verb \\
\text{FORM} \quad finite
\end{bmatrix} \\
\text{VAL} \quad
\begin{bmatrix}
\text{SPR} \quad null \\
\text{COMPS} \quad null
\end{bmatrix}
\end{bmatrix} \\
\text{CONT\ldots E} \quad
\begin{bmatrix}
\text{ASPECT} \quad imperfective \\
\text{MOOD} \quad realis
\end{bmatrix}
\end{bmatrix}
$$

b.

$$
\begin{bmatrix}
word \\
\text{STEM} \quad \left\langle \text{``ompoke''} \right\rangle \\
\text{CAT} \quad
\begin{bmatrix}
\text{HEAD} \quad
\begin{bmatrix}
verb \\
\text{FORM} \quad irrealis\text{-}form
\end{bmatrix} \\
\text{VAL} \quad
\begin{bmatrix}
\text{SPR} \quad null \\
\text{COMPS} \quad null
\end{bmatrix}
\end{bmatrix} \\
\text{CONT\ldots E} \quad
\begin{bmatrix}
\text{ASPECT} \quad null \\
\text{MOOD} \quad realis
\end{bmatrix}
\end{bmatrix}
$$

In particular, the mood value in (14b) is the result of unification with constraints imposed from *tera*.

As mentioned earlier, exhaustive negator *mameri* functions in exactly the same way as the descriptive negators: *mameri* is captured with identical structure to *tera*, but with a different PRED value representing exhaustive negation.

The analysis for metalinguistic negator *matsi* is somewhat simpler. Michael 2008 describes *matsi* as being 'external' to the clause structure, and it does not interact with reality status or aspect in any way. The motivating factors for headedness in the descriptive negators are absent for *matsi*: *matsi* does not govern any following clause, determine concord features, support morphosyntactic marking, subcategorize what can occur with it, nor semantically head its phrase. In fact it fails all of Zwicky 1985's tests for headedness. In the absence of evidence for headedness, we simply analyze *matsi* as a scopal adverb that takes a saturated sentence in its MOD list and only appears to the left of the head (*i.e.*, is [POSTHEAD −]). This attaches via the usual head-modifier phrase. To allow *matsi* to interact with the descriptive negators, we further constrain its MOD value to be [NEGATED +]. Thus, descriptive negators cannot take as a complement any clause which *matsi* has modified, and *te matsi* fails to unify.

(15)

$$
\begin{bmatrix}
\textit{neg-adv-lex} \\
\text{STEM} \quad \left\langle \text{"matsi"} \right\rangle \\
\text{SYNSEM...CAT}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
\textit{adv} \\
\text{MOD} \left\langle \text{LOCAL.CAT}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
\textit{verb} \\
\text{NEGATED} \quad +
\end{bmatrix} \\
\text{VAL}
\begin{bmatrix}
\text{SPR} \quad \text{null} \\
\text{COMPS} \quad \text{null}
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix} \\
\text{VAL}
\begin{bmatrix}
\text{SPR} \quad \text{null} \\
\text{COMPS} \quad \text{null}
\end{bmatrix} \\
\text{POSTHEAD} \quad -
\end{bmatrix}
\end{bmatrix}
$$
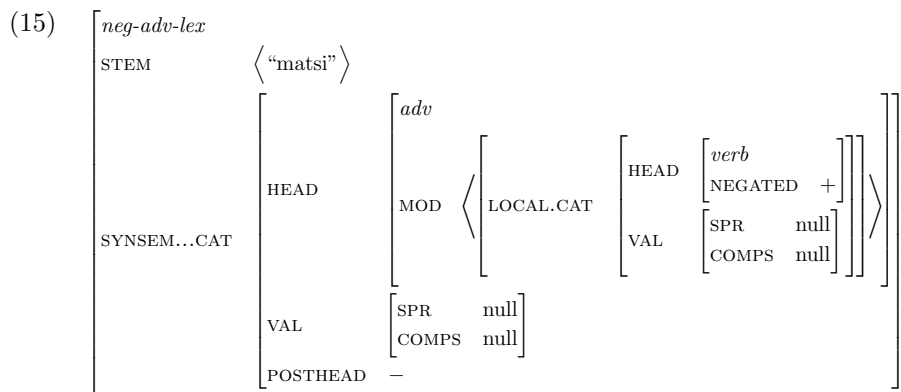
With these analyses, we may then produce a rough tree for the sentence *matsi te pishenetemparo*[6] in example (16).

(16)
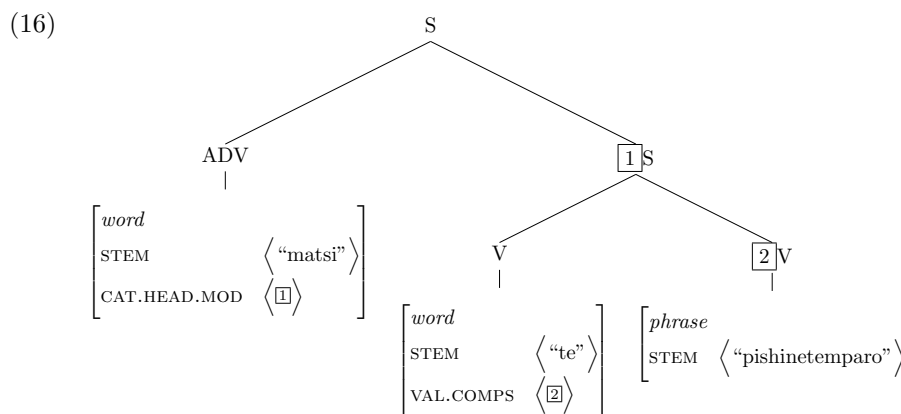
These combined analyses allow the descriptive negators, as auxiliaries, to take a complement verb that is of one form (realis or irrealis) while semantically/notionally indicating the opposite. We are also able to successfully reject examples with both a descriptive negator and an aspect, such as *Hara inihake* (6b). The HEAD.NEGATED feature and associated constraints prevent sequences of "*te matsi*" from parsing while allowing "*matsi te*", regardless of intervening adjuncts between the negators. Thus we have a well-motivated analysis of two negators *tera/hara* as syntactic auxiliaries, and one negator *matsi* as a pre-head modifier, even though neither type takes inflectional morphology, and thus there are no morphological cues to differentiate them in this case.

5 Typology

Crowgey 2013 presents a survey of predicted negation strategies from an HPSG perspective. These predictions include the simple set: negation by inflection; by auxiliary verb; by selected complement; and by free modifier; as well as the more complex bipartite set, where negation is expressed via two obligatory morphemes with one selecting for the other (not observed in Nanti). Since we

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[6]This is similar but not identical to the sentence in example (7), as the final *oka* in that sentence exhibits topicalization, a feature of Nanti which is beyond the scope of this paper.

built our grammar on the Grammar Matrix, it is built on a foundation that assumes Crowgey's theoretical framework. Nevertheless, our analysis shows Nanti to be compatible with these theoretical predictions, with the descriptive negators *tera* and *hara* and the exhaustive *mameri* mapping onto an auxiliary strategy (aux-neg in Crowgey's typology), and metalinguistic *matsi* using a free modifier strategy (mod-neg). The Nanti data does bring up an interesting complication in showing a language with multiple syntactic strategies for main-clause negation. So far as we are aware, there is no reason to presuppose that languages will exclusively use one strategy for negating main clauses rather than several. Indeed, the (at this point dated) use of sentence-final pause and emphatic *not* in English can be analyzed as a mod-neg (17), in addition to the normal use of *not* as a comp-neg (18):

(17)　　We had fun... not.

(18)　　We did not have fun.

While there have been formal analyses showing distinct negation strategies for different kinds of clauses (such as Borsley and Jones 2005, which illustrated different negation strategies for finite main clauses versus non-finite subordinate clauses and imperative clauses in informal Welsh), we do not know of any that indicate multiple negation strategies simply for main clauses. However, if syntactic strategies for negation can vary with slang in the above way in English, there is no reason to assume a language cannot have more than one stable main-clause negation strategy. We have outlined the means by which we have determined the type of negation strategies presented in the data, and we believe that the interaction between different negators is a potentially fruitful area of future typological research. Within the set of field descriptions for minority languages, one item to look for is the putative difference between external-clause and internal-clause negators: this descriptive account may indicate different syntactic strategies.

Morphology can sometimes help determine if a negator is a head or a dependent, but in this case we used the interaction between the negators and the verbs they combine with to determine that *tera* and *hara* are heads. This approach can be applied cross-linguistically to distinguish negators in languages that employ multiple strategies.

6　　Acknowledgements

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