Tukang Besi Clauses without Embeddings

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Abstract. This paper uses standard scoping properties (as found with lambda calculus and predicate logic) to account for linking dependencies and constituency in Tukang Besi, an Austronesian language of Indonesia. Attention is limited to clauses that don't themselves have clause embeddings. Basic argument dependencies are established with a combination of verbal agreement, case marking and constituent order. If taken alone, no one of these is sufficient to determine the grammatical relations in the clause. Rather these different factors operate in combination to yield unambiguous clauses, with scope properties governing which combinations are allowed and which are disallowed.

1 Syntactic Scope and Accidental Hiding

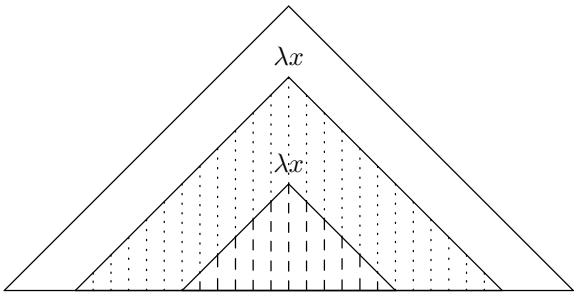
First we introduce some basic formulas that look much like lambda terms. We will call such formulas core syntax forms or **CS forms**. The data we cover will be seen to match the scoping requirements of this syntax.

Definition 1 (core syntax) *Let a set $\mathcal{V}$ of variables be given. CS, the core syntax, is the smallest set such that:*

$\mathtt{P}(x_1, ..., x_n) \in CS$ *for any n-ary predicate* $\mathtt{P}$, $x_1, ..., x_n \in \mathcal{V}$
$\lambda x \phi \in CS$ *for any* $\phi \in CS$, $x \in \mathcal{V}$
$\phi\ \psi \in CS$ *for any* $\phi, \psi \in CS$

We have predicate formulas, an operator λx, which opens a fresh x-scope, and a means of concatenating formulas. Since there is only one means of joining formulas, an operator for concatenation is left implicit. We can picture the types of binding relations we get with (1).

(1)



We see from (1) how $\lambda x\phi$ opens an x-scope that continues to remain open throughout ϕ (the dotted shading); unless another λx is met, whereupon the x-scope will be that of the new binding (the dashed shading).

As an example, consider (2), with its distinct variable names x and y.

(2) $\lambda x(\texttt{P}\ \lambda y(\texttt{Q}\ \lambda x\texttt{R}(x)))$

Assume the subformula $\texttt{R}(x)$ is a formula of arbitrary complexity that contains x free. Then each free occurrence of x in $\texttt{R}(x)$ is captured by the inner λx, so that the name bound by the outermost λx is hidden from the viewpoint of $\texttt{R}(x)$. Indeed, there is no way to refer to the outermost λx from within $\texttt{R}(x)$. In contrast, λy remains accessible from within $\texttt{R}(x)$. This property of scoping formulas is usually referred to as **accidental hiding**.

Accidental hiding is generally not considered a cause for concern, since the treatment of binding constructs in most logical formalisms allows for working with formulas "up to the renaming of bound variables."[1] This allows for the general convention that bound variables can be renamed at any moment, and thus accidental hiding can always be avoided. This convention works well in the abstract, but what if we had to pre-choose a single representation for each formula; and in particular, what if we needed to decide how occurrences of variables were to be represented without the option of future change. Such concerns are very real for computer scientists who wish to implement logical formalisms, and we will suppose they are just as real for natural language, which, after all, has implemented languages.

In what follows, instances of accidental hiding with CS forms will be found to match up either with unobtainable scope readings for sentences of Tukang Besi or with sentences that are ungrammatical in Tukang Besi.

2 Some Argument Structure Terminology

In argument structure terms we can identify three 'positions' in terms of the ordered arguments of a verb:

1. the highest role;
2. the lowest role (/the second highest role);
3. a position that is both the highest and lowest role; that is, it is the sole argument in the subcategorisation frame.

Following (approximately) Comrie (1978) and Andrews (1985) we will use the abbreviations A, P and S to refer to the positions (loosely) described in 1, 2 and 3, respectively. More specifically:

– An A is the most agent-like argument of a polyvalent verb, the highest role, which is not simultaneously the lowest role.

[1] This property is usually referred to as α-equality.

– The label P refers to the non-A argument in a prototypical bivalent verb, and to the argument in a trivalent (or quadrivalent) predicate which shows the same morphosyntactic behaviour. It is the lowest (/second highest) role in the verb's subcategorisation frame, but it is not simultaneously the highest.
– An S is the single argument of a monovalent verb; it is the highest role in the verb's subcategorisation frame, and can simultaneously be described as the lowest role in the frame.

These are syntactic roles in the sense of relationships existing at argument structure that can frequently be shown to affect morphosyntactic categories in languages. However, they are not descriptors of grammatical status, though the identity of grammatical functions such as subject and object may be defined, after examining the properties of appropriate constructions in the language, in terms of the appropriate groupings of these roles. It will turn out for Tukang Besi that such a position cannot be maintained, while it can be maintained for say English.

3 Some Tukang Besi Data

Tukang Besi is a mixed head-marking and dependent-marking language, with agreement on verbs and case marking on all nominals. Examples of clauses in Tukang Besi with monovalent and bivalent verbs are given in (3)–(5).

(3) a. **No**-tinti=mo **na mo'ane**.
3R-run=PF NOM man
'The man has run (away).'
b. *__No__-tinti=mo **te mo'ane**.
c. **Te mo'ane no**-tinti=mo.
CORE man 3R-run=PF
'The man, he has run (away).'
d. *__Na mo'ane no__-tinti=mo.

(4) a. **No**-tu'o=mo te kau **na mo'ane**.
3R-chop=PF CORE tree NOM man
'The man chopped down the tree.'
b. *__No__tu'omo **na mo'ane** te kau.
c. **Te mo'ane no**-tu'o=mo te kau.
CORE man 3R-chop=PF CORE tree
'The man, he chopped down the tree.'
d. *Te kau **no**tu'omo **na mo'ane**.

(5) a. No-tu'o=**ke**=mo te mo'ane **na kau**.
3R-chop=3P=PF CORE man NOM tree
'The man chopped down the tree.'
b. Notu'o**ke**mo **na kau** te mo'ane.
c. **Te kau** no-tu'o=**ke**=mo te mo'ane.
CORE tree 3R-chop=3P=PF CORE man
'The tree, the man chopped it down.'

d. *Te mo'ane notu'o**ke**mo **na kau**.

In (3) we see examples of a simple monovalent clause consisting of a verb and a single argument. While other elements are possible (such as time expressions and other adjuncts), these are examples of minimal fully-specified clauses. The verb is marked for agreement with a third person argument with the prefix *no-*, which is also specified for realis mood. Also the verb is marked for perfective aspect with the clitic *=mo* (as will be the case with many subsequent examples). This is not essential, but does lead to more natural interpretations in some instances.

The nominal *mo'ane* 'man' appears with the case marker *na* in (3a). This is the only possible case marker for this argument in this position; marking with the only other plausible case marker, *te*, is not grammatical, as can be seen in (3b). The *te* case marker is found on the same argument, if this argument appears preverbally, as in (3c). As (3d) shows, a preverbal argument cannot appear with the case marker *na*, even when *na* is the case marker that it would appear with postverbally.

The lexical semantic content of (3a) and (3c) is the same, but, as indicated approximately by the translations provided, the pragmatic implications of the two sentences are different. While (3a) is a 'neutral' statement, without any particular emphasis or contrast implied, (3c) is used with particular identificational focus on 'the man'.

Taking the clause in (3a) with a postverbal subject to be more 'basic' than the clause in (3c), we can also see that Tukang Besi is a verb-initial language. We address the question of the positioning of adjuncts in section 5.

In (4) and (5) we have examples of polyvalent clauses, formed with the verb *tu'o* 'chop down'. In (4a) we can see that the generalisations we formed about case marking and verbal agreement in monovalent clauses on the basis of an examination of (3) are just as valid here, the only addition being that now a postverbal *te*-argument is licensed, the object of the verb taking the *te* case marker. (4b) shows that the order of the subject and the object following the verb is fixed: the object must occur closer to the verb than the subject. In (4c–d) we see that bivalent clauses also allow for an argument to appear in the preverbal position; only the 'man' argument is eligible to appear preverbally, as shown in (4c), and when preverbal it must appear with the *te* case marker, just as in (3c). It is not grammatical for the 'tree' argument to appear preverbally, (3d).

The clauses in (5) are in many ways the 'reverse' of the clauses in (4). Having the same verb as the clauses in (4), the clauses in (5) are still bivalent, but they show a change in verbal agreement: the prefixal agreement is unchanged, but there is an additional enclitic agreement marker that indexes the 'tree' argument of the clause. Furthermore, we see that the case markers *te* and *na*, while still appearing in (5), have exactly the opposite functions, in terms of syntactic roles, to their functions in (4). In (4a) *na* appeared marking the A, 'man', while *te* was used to mark the P, 'tree'. In (5) it is the P which is marked with *na*, while the A is marked with *te*. (5b) demonstrates another difference between the bivalent clause type in (5) that shows agreement for P and the clause type in (4) that does not: while (4b) shows that the relative order of the postverbal A and P is fixed

in a clause with P-agreement, (5b) shows that no such word order restrictions are found in clauses with P-agreement. (5c) and (5d) show that while preverbal positioning is still possible, the argument which may appear preverbally is the P, and not the A, as in (4).

Some additional points are worth emphasising. We have seen from (4c) and (5c) that the (CORE) case marker *te* may appear multiple times in the clause, marking all terms. It follows that *te* cannot be considered to be confined to a particular semantic or syntactic role in the clause, and so case labels such as 'ergative', 'accusative' etc. will not apply to it. We have seen that the argument which in more 'neutral' contexts (e.g., (3a), (4a), (5a,b)) appears postverbally with the *na* case marker can, in discourse-prominent contexts, appear preverbally, marked with *te*, a different case marker (e.g., (3c), (4c), (5c)). In expressions without a P enclitic (such as (4a) or (4c)), the *na* marked phrase (or the preverbal *te*-marked phrase) is associated with the highest argument position; while in expressions with a P enclitic (e.g., (5a–c)) the *na* marked phrase (/preverbal *te* phrase) is associated with the second highest argument position of the verb's subcategorisation frame. Put more intuitively, in (4a,c) the *na* marked phrase (/preverbal *te* phrase) is the 'man', while in (5a–c), it is the 'tree,' yet this change in the association of arguments and case appears with the verb 'chop' remaining constant (that is, there are no valency-affecting operations that distinguish (4) from (5)). Finally, we note that, as (4d) and (5d) show, a fronted *te* NP is not compatible with a postverbal *na* NP.

4 Establishing Basic Argument Dependencies

From the data in (3)–(5), we see that basic argument dependencies are established with a combination of verbal agreement, case marking and constituent order. None of them is enough on its own to determine the syntactic relations; the identities of the A and P are clear from verbal agreement, but their syntactic 'status' is not. The case marking alternatives available to bivalent clauses show quite clearly that we cannot uniquely associate any one case with any one syntactic role or relation. The order of elements in the clause shows enough variation that there can be no simple declaration that there is one basic order for the language. Rather, these different factors operate in combination to yield (usually) unambiguous clauses.

Excluding pragmatic fronting, the possibilities for a clause are shown in (6), where *no* is the prefix for S/A; *ke*, the clitic for P; *na*, nominative case; and *te*, the non-nominative CORE case.

(6) a. *no*-V *na* S
b. *no*-V *te* P *na* A
c. *no*-V-*ke* *na* P *te* A
d. *no*-V-*ke* *te* A *na* P

The make up of a clause with an intransitive verb is illustrated in (6a). (6b–d) illustrate options for the encoding of a clause with a polyvalent verb. The choice

of (6b) versus (6c,d) depends on the need, pragmatic or syntactic, for the P to be the nominative argument in the clause. There is no pragmatic difference between (6c) and (6d); they are essentially free variants of each other.

With preverbal fronting (a position of pragmatic focus or contrast) the number of word order possibilities increases, as shown in (7).

(7) a. *te* S *no*-V
b. *te* A *no*-V *te* P
c. *te* P *no*-V-*ke* *te* A

The argument in the preverbal position is always marked with *te*, and must be the argument that would have been marked with the nominative case if it were to have appeared postverbally, hence the contrast between the acceptable (5c) and the ungrammatical (5d).[2]

4.1 Assumptions for the Analysis

We now turn to a first sketch of how the Tukang Besi data of (3)–(5) can be found to match the syntax of definition 1. We will quickly see that the scoping properties of definition 1, complete with the prospect of accidental hiding, are the key to replicating which argument links are possible and which argument links aren't.

To get things started, we need to make assumptions about what links to a scope and what opens a scope where:

- An S/A-prefix opens a *no*-scope over the verb and all postverbal material. This binds (possibly among other things) the highest argument position of the verb.
- A P-enclitic opens a *ke*-scope, which takes narrowest scope with respect to the verb. This binds (possibly among other things) the second highest argument position of the verb.
- The case marker *te* opens a *te*-scope from its syntactic location. This binds nominals, and is somehow linked to the verb.
- The case marker *na* plays a 'dummy' role: it does not open a scope.
- All nominals of core arguments link to a *te*-scope, having predicate form: `P(`*te*`)`.
- A *te*-scope is always opened as the outermost scope.

We will call the outermost *te*-scope that is always opened, the **discourse scope** (DS). In sentences with a preverbal *te* NP, like (3c), (4c) and (5c), the preverbal *te* NP opens the DS. For sentences without a preverbal *te* NP, the current discourse will have opened the DS.

[2] It is also possible for a time expression to appear in this preverbal position, but no predicate subcategorises for a time expression as a basic argument in Tukang Besi.

4.2 The Emerging Picture

What picture of Tukang Besi emerges from these assumptions? NPs do one of two things: either they open a new *te*-scope (when *te* case marked), or else they link to an already open *te*-scope (when *na* case marked). Verbs themselves carry open scope operators: they always carry an S/A prefix to open a *no*-scope that takes wide scope with respect to the verb and postverbal material, and they can in addition carry a P enclitic to open a narrow *ke*-scope. That verbs themselves carry open scope instructions comes as a necessity, since NP linking is itself so impoverished, showing no differentiation among the different core arguments, which all link to a *te*-scope.

We have already noted the assumption that each *te*-scope must *somehow* link to the verb. As an assumption this should not be controversial. It is just a way to spell out that an opened scope should play a role in the interpretation of the clause.

We can be very noncommittal regarding how links are established and simply assume that they are made if and when they can be. In practise, this will either be by binding of a vacant argument slot of the verb, or by linkage to an open *no*- or *ke*-scope that binds an argument slot of the verb. These assumptions bring about a lot of interesting, and importantly testable, consequences. It is exactly these consequences that we see reflected in the Tukang Besi data.

Let us see the machinery in operation. First off, we see how things play out for (3b), an example that codes its single argument with a preverbal *te* NP. This can be matched to the CS form (8). The *te* NP opens a *te*-scope with widest scope, making it the DS. The DS binds the nominal `MAN(`*te*`)` and links to the verb with the aid of the *no*-scope opened by the verb's S/A prefix, via the $no = te$ link.

(8) $\underline{\lambda te}$(`MAN(`*te*`)` $\lambda no(no = te$ `RUN(`*no*`)`))
Te **mo'ane** **no-** tintimo

Here, and in what follows, we underline the operator that opens the DS. This underlining has no formal or theoretical significance, and is added purely to ease reference to the DS.

Now we consider (9) (= (3a)). This is identical to (8), except for the positioning (and case marking) of the 'man' argument in the clause. Also, in (9), it is the discourse that opens the DS. (9) is not a felicitous way to commence a stretch of discourse, as (8) is. Rather, (9) is a felicitous way to continue a stretch of discourse with a previously identified DS. This DS links to the verb via the *no*-scope opened by the verb's S/A prefix, giving the DS a role to play in the interpretation. Since *na* acts as a dummy, that is, it doesn't itself open a scope, the NP it case marks links to the active *te*-scope, which happens to be the DS, and so the only possible interpretation is that *mo'ane* 'man' is linked as the S of the verb.

(9) $\underline{\lambda te}$ $\lambda no(no = te$ `RUN(`*no*`)` `MAN(`*te*`)`)
No- tintimo **na mo'ane**

Now we consider the basic bivalent clause without agreement for P, as in (10) (= (4a)). We see with (10) how the added complication of an extra argument leads to an only slightly more complicated analysis, since the scoping requirements eliminate many of the putative linking possibilities we might try to apply. As with (9), (10) is felicitous only if the discourse has already opened the DS, which links to the verb via the *no*-scope opened by the verb's S/A prefix; also the *na* marked NP links to the active *te*-scope, which is the DS. What is new, compared to (9), is that a second *te*-scope is opened by the postverbal *te* marked NP. This binds the nominal *kau* 'tree', and the free slot of the verb's subcategorisation frame, which happens to be the P.

(10) $\underline{\lambda te}\ \lambda no(no = te \quad \lambda te(\ \texttt{CHOP}(no, te) \quad \texttt{TREE}(te)\ )\quad \texttt{MAN}(te) \quad)$
No- tu'omo te kau **na mo'ane**

Keeping the fact that the S/A prefix of the verb opens a single *no*-scope, could the linking have been different? The answer is no. Underlying the scope requirements is the fact that the verb and DS must link. This is achieved in (10) because of the coidentity $no = te$. Since *na* does not open a scope, there is no scope opened by *na mo'ane* 'the man' to prevent $no = te$ bringing about a link with the DS. Instead, *mo'ane* is left to also link with the DS.

The best we can do to get an alternative linking, that links the DS to the P of the verb, is to have $te = te$. But this just gives the infelicitous (11), with its embedded *te* hiding the DS, with the effect that the DS is left without a link to the verb, linking only to the nominal $\texttt{MAN}(te)$.

(11) $\#\underline{\lambda te}\lambda no(\lambda te(te = te\ \texttt{CHOP}(no, te)\ \texttt{TREE}(te))\ \texttt{MAN}(te))$

We might instead try to link the P of the verb, *kau* 'tree', with the DS by changing the word order, as in (12) (= (4b)). But, as the star of (12) tells us, such attempts are doomed. (12a–c) give possible CS forms that we might reasonably give the sentence, and each is bad.

(12) ***No**tu'omo **na mo'ane** te kau.
a. $\#\underline{\lambda te}\lambda no(no = te\ \lambda te(\texttt{CHOP}(no, te)\ \texttt{MAN}(te)\ \texttt{TREE}(te)))$
b. $\#\underline{\lambda te}\lambda no(no = te\ \texttt{CHOP}(no, te)\ \texttt{MAN}(te)\ \lambda te(te = no\ \texttt{TREE}(te)))$
c. $\#\underline{\lambda te}\lambda no(no = te\ \texttt{CHOP}(no, te)\ \texttt{MAN}(te)\ \lambda te(te = te\ \texttt{TREE}(te)))$

First we note that, in contrast to (10), the *te*-scope opened by *te*-tree of (12) cannot scope over the verb. When it does, as in (12a), it also scopes over *na*-man. As a result, *na*-man links to *te*-tree rather than the DS, which is left without a link to the clause. But perhaps *te*-tree could itself open an independent scope and then try to link to another open scope. The problem here is that there is no useful scope for *te*-tree to link to: in (12b) we try and link to *no*, but all we get is a linking of $\texttt{MAN}(te)$ and $\texttt{TREE}(te)$; in (12c) we try to link to the DS, but of course we cannot because *te*-tree itself, in opening up a *te*-scope, hides access to the DS.

Let us now consider a different basic bivalent clause type, one that appears with the enclitic *ke* on the verb, such as (13) (= (5b)). How does the linking in this example work? The discourse has already opened the DS. A *no*-scope is opened by the verb's S/A-prefix, which takes wide scope over the verb and all postverbal material. The *te* marked NP opens a *te*-scope that is kept local to the nominal and linked to the verb via the open *no*-scope. The *na* marked NP, unable to open any scope itself, links to the open *te*-scope, which is the DS. The DS is itself linked to the verb via the *ke*-scope opened narrowly to the verb by the P suffix. A notable feature of the success of this linking of the DS to the verb is the lack of any interference from the scope opened by the *te* NP, which was kept narrow.

(13)	$\underline{\lambda te}$	$\lambda no($	$\lambda ke(ke = te$	$\texttt{CHOP}(no, ke)$)		$\texttt{TREE}(te)$	$\lambda te(te = no$
		No-		tu'o	-**ke**mo	**na kau**	te
	$\texttt{MAN}(te))$)						
	mo'ane						

Could the linking for (13) have gone differently? The answer is no. Here are some alternatives:

(14) a. $\#\underline{\lambda te}\lambda no(no = te\ \lambda te(\lambda ke(ke = te\ \texttt{CHOP}(no, ke))\ \texttt{TREE}(te)\ \texttt{MAN}(te)))$
b. $\#\underline{\lambda te}\lambda no(no = te\ \lambda ke(\texttt{CHOP}(no, ke))\ \texttt{TREE}(te)\ \lambda te(te = no\ \texttt{MAN}(te)))$
c. $\#\underline{\lambda te}\lambda no(no = te\ \lambda ke(\texttt{CHOP}(no, ke))\ \texttt{TREE}(te)\ \lambda te(te = ke\ \texttt{MAN}(te)))$

In (14a), *te*-man scopes over the verb. This is out since it prevents *ke* from linking to the DS. As a consequence in (14a), while the DS links to $\texttt{MAN}(te)$, it fails to link to the verb. In (14b), *no* links to the DS. This has the unfortunate result of linking the two arguments $\texttt{MAN}(te)$ and $\texttt{TREE}(te)$: $\texttt{MAN}(te)$ links to *no* and $\texttt{TREE}(te)$ links to the DS. In (14c) we try and avoid the problem that befalls (14b) by linking *te*-man to *ke*. The problem here is that *te*-man is outside the scope of *ke*, which can only take narrow scope with respect to the verb. From this last example we see that *ke* must link to the DS, since this is its only hope of, in effect, extending its scope to link to an NP.

So much for (13), but we might wonder about alternative word orders when the verb comes with *ke*. Alternative orders are possible, and an example of a sentence with a different order, maintaining postverbal alignment for all arguments, is given in (15) (= (5a)):

(15)	$\underline{\lambda te}$	$\lambda no($	$\lambda ke(ke = te$	$\texttt{CHOP}(no, ke)$)		$\lambda te(te = no$	$\texttt{MAN}(te))$
		No-		tu'o	-**ke**mo	te	mo'ane
	$\texttt{TREE}(te))$						
	na kau						

The CS form given is perfectly acceptable, much as was the case with (13). Could things have been different? No they could not, since alternatives would fall into the same types of traps as we saw in (14b,c). However, there is one possible contender:

(16) $\underline{\lambda te}\lambda no(no = te\ \lambda te(\lambda ke(ke = te\ \texttt{CHOP}(no, ke))\ \texttt{MAN}(te))\ \texttt{TREE}(te))$

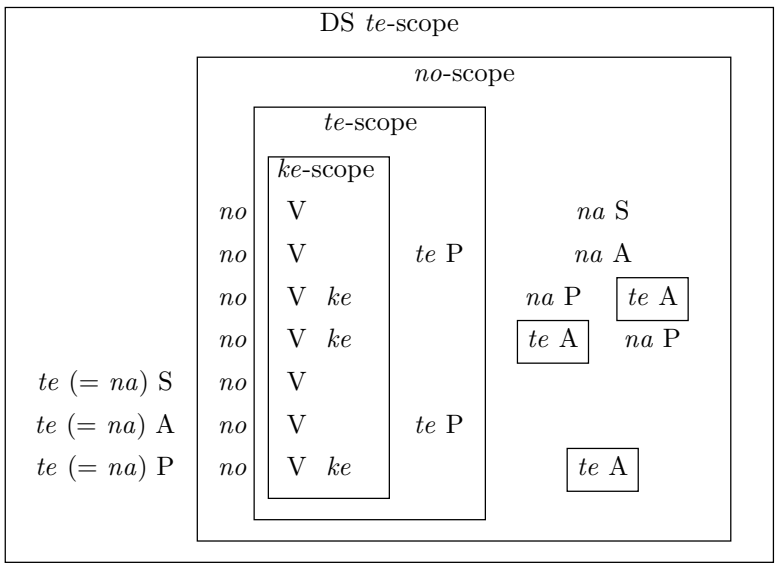
Here *te*-man scopes over the verb to link to the *ke*-scope and there is no intervening TREE(*te*) to worry about, like there was with (14a). As a consequence, TREE(*te*) lies outside the scope of *te*-man and so is bound by the DS, which is linked to the *no*-scope. As a result, (16) gives an interpretation in which tree chopped down man. This is not just an unlikely interpretation for (5a), but an impossible interpretation. (5a) is unambiguously about man chopping down tree.

We claim that the constituency of Tukang Besi rules out (16) as an available CS form. To scope directly over the verb, as it does in (16), *te mo'ane* 'the man' would need to be part of the verb-phrase (cf. *te kau* 'the tree' in (10)). From constituency tests, we know that this is not the case (see section 5). Hence, *te mo'ane* 'the man' cannot scope directly over the verb. Rather, it is forced to take a local scope (which recall was required in (13)), which returns us back to (15) as the only available CS form. While we cannot rule (16) out with scoping principles alone, we see that the language independently rules out the option — on the basis of its required constituency. The same effect arises to make (5c) unambiguous.

4.3 Summary

We can summarise the findings of this section with (17). This illustrates the scoping properties of the clause types of (6) and (7), that we have found our assumptions to enforce.

(17)



5 Constituency

The assumptions we have made about scope give a clear idea of what constituency is expected to be like in Tukang Besi. This is something we can test for empirically.

In what follows, the symbol △ indicates positions in the sentence where the tested element may appear; * indicates an ungrammatical placement. Only positions outside NPs are considered.

5.1 Locative Adjuncts

Locative adjuncts, by which we mean any expressions denoting an inner or outer locative, a goal, or a source, referring to space, must occur to the right of the VP. In (18)–(21) we can see this principle, and the right edge of the VP that it delimits, by testing with the locative phrase *di koranga* 'in the garden'. While (18) and (19) show a pattern in which the *na*-marked argument is always to the right of any locative expressions, and a *te*-marked argument is to the left, in (20) and (21) we can see that both the arguments are to the right of this boundary.

(18) [$_{VP}$ Notinti] na ana.
* △ △
'The child ran in the garden.'

(19) [$_{VP}$ Notu'o te kau] na mo'ane.
* * △ △
'The man chopped down the tree in the garden.'

(20) [$_{VP}$ Notu'oke] te mo'ane na kau.
* △ △ △
'The man chopped down the tree in the garden.'

(21) [$_{VP}$ Notu'oke] na kau te mo'ane.
* △ △ △
'The man chopped down the tree in the garden.'

In summary, locative adjuncts must appear following the VP, but may intervene between other arguments of the clause.

5.2 Time Adjuncts

Time adjuncts are found to the right of the IP that immediately dominates the VP. Many time adjuncts occur with the same general oblique case marker that is found with locations, but nonetheless show the same placement as non-case marked time expressions. Here the placement options have been tested with *sio'oloo* '(in the) afternoon'. We can see that *sio'oloo* is strictly constrained to appear clause-finally in (22) and (23), while in (24) and (25) the two arguments may follow *sio'oloo*.

(22) [IP [VP Notinti] na ana].
* * △
'The child ran in the afternoon.'

(23) [IP [VP Notu'o te kau] na mo'ane].
* * * △
'The man chopped down the tree in the afternoon.'

(24) [IP [VP Notu'oke]] te mo'ane na kau.
* △ △ △
'The man chopped down the tree in the afternoon.'

(25) [IP [VP Notu'oke]] te mo'ane na kau.
* △ △ △
'The man chopped down the tree in the afternoon.'

The evidence of (22)–(25) is that time adjuncts appear following the IP that immediately governs the VP.

5.3 Adverbs

In (26)–(28), possibilities for the placement of the adverbial *merimba* 'quick' are shown.

(26) [VP Notinti] na ana.
△ △ *
'The child ran quickly.'

(27) [VP Notu'o te kau] na mo'ane.
△ △ △ *
'The man chopped down the tree quickly.'

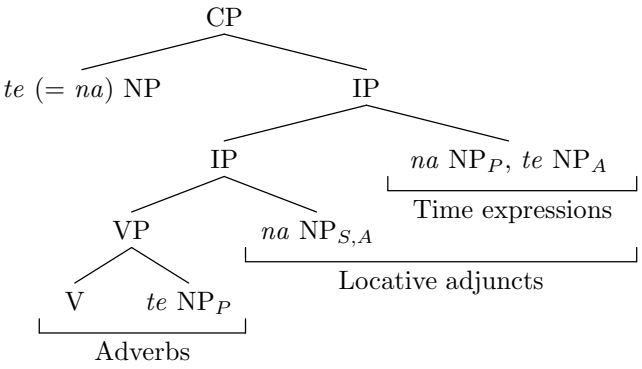
(28) [VP Notu'oke] te mo'ane na kau.
△ △ * *
'The man chopped down the tree quickly.'

The positional possibilities for adverbs clearly delimit the extent of the VP, since adverbs can be found anywhere inside the VP (there are some additional restrictions which do not concern us here — see Donohue 1999: 177–179).

5.4 Summary

With the data we have collected, we can model the clause in Tukang Besi as shown in (29).

(29)



The structure of (29) matches exactly the scope results pictured in (17).

6 Summary

In summary we wish to simply point out that it is surprising that such basic scoping properties as we have assumed in this paper can already be used to account for so much grammatical data in a language. Not only were the CS forms shown to closely replicate the Tukang Besi data, they also provided a rational for why the data is the way that it is.

An obvious concern will be how the outlook of this paper scales-up, since the simple syntactic scoping requirements of section 1 cannot possibly account for *all* data in a natural language. Indeed, the present account falls short as soon as we look at data involving clause embeddings in Tukang Besi. This can be remedied with an extension of the CS language that includes a more involved semantic scope to realize localities, but this we leave for another occasion.

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