

Morphology is Structure: A Malagasy Test Case

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We think here of a (generative) grammar G as, in essence, a lexicon Lex_G and a set F_G of structure building ("generating") functions. Elements of Lex_G , called *lexical items*, are pairs consisting of a string (phonological matrix) and a grammatical category. L_G , *the language generated by G* , is the set of all expressions which can be formed from Lex_G by finitely many applications of the generating functions. See Keenan and Stabler (1991,1995) for a formalization. Within this naive though mathematically explicit conception of grammar we present a syntactic and semantic analysis of the voicing affixes in Malagasy. Part I illustrates our analysis. Part II sketches a "generic" GB analysis drawing largely on GHT (Guilfoyle, Hung, and Travis, 1992), and Part III compares the two approaches.

I. A Predicate Building Approach to Voice Affixes in Malagasy: A Sample Analysis

The Ss in (1) below constitute a very partial illustration of the voicing system of Malagasy. We use them to illustrate a predicate building (PB) approach to voice in Malagasy.

- (1) a. N + i + vidy ilay satroka hoan-dRasoa Rabe
 past+active+buy that (aforementioned) hat for-Rasoa Rabe
Rabe bought that hat for Rasoa
- b. No + vidy + ina + Rabe (novidin-dRabe) hoan-dRasoa ilay satroka
 past+buy+passive+Rabe for-Rasoa that hat
That hat was bought for Rasoa by Rabe
- c. N + i + vidy + ana + Rabe (nividianan-dRabe) ilay satroka Rasoa
 past+active+buy+circumstantial+Rabe that hat Rasoa
Rasoa was bought-for that hat by Rabe

roots In the Lexicon of Malagasy we include an entry whose string part is *vidy* ('buy'). Its category is 'RT{AG, TH}', indicating that it is a root and is associated with a two element set of theta roles, AGENT and THEME. Semantically this entry is interpreted as a binary relation (\approx a two participant event), noted VIDY¹.

active verbs We shall think of the active marker *i-* (one of many) as introduced by a function *I-* which takes certain roots as arguments yielding transitive verbs as values. So $I-(vidy) = ividy$ is of category Transitive Verb interpreted as a binary relation satisfying certain conditions. In more detail, *ividy* combines first with an accusative NP (\approx DP) to form an expression (which we theory neutrally call 'Predicate Phrase') which combines with a nominative NP to form an S. In a standardish but space costly notation we may note this category of transitive verb as in (2a). In certain contexts we might eliminate the notation 'S' (\approx 'IP'...), and if it is assumed that all verbs take a nominative argument we could eliminate that too. For explicitness we shall not eliminate those elements here, but we shall use the one line notation in (2b).

- (2) a. S
 NP NP
 nom acc
- b. S[NP_{nom}, NP_{acc}]

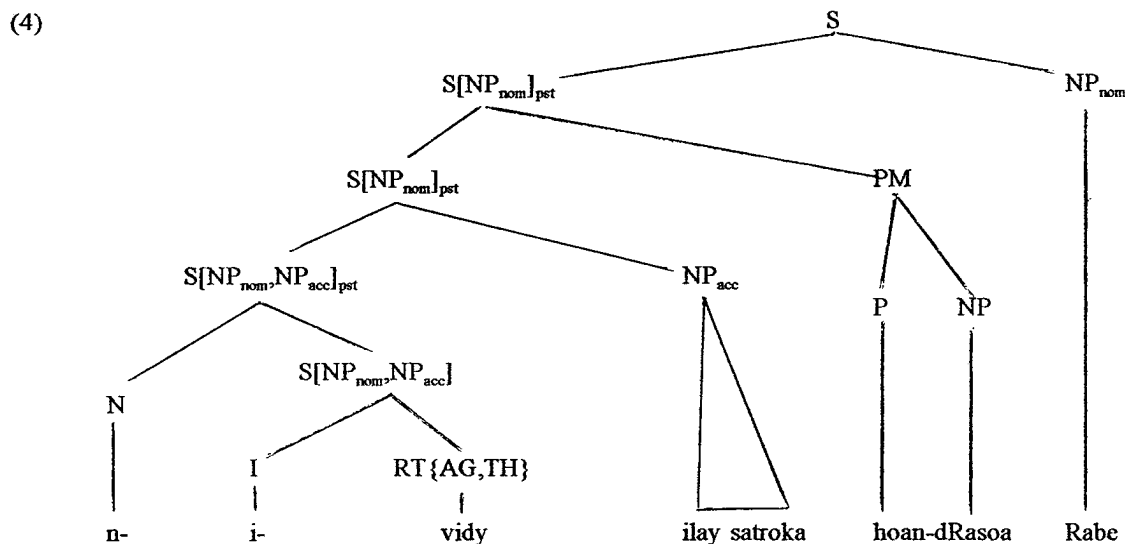
In the (2b) notation the "NP" notations are ordered. Thus we understand that the rules which combine verbs with NPs combine first with the NP indexed on the rightmost side of the sequence. So an expression like *ividy* of the category in (2b) will combine with an accusative NP to form an expression of category S[NP_{nom}], one that in turn will combine with a nominative NP to form an S.

Semantically we interpret *ividy* of category $S[NP_{acc}, NP_{nom}]$ as a function mapping an object y to a function which maps an object x to True iff y stands in the THEME relation to VIDY, noted $THEME(y, VIDY)$, x stands in the AGENT relation to VIDY, $AGENT(x, VIDY)$ and x stands in the VIDY relation to y , $VIDY(x, y)$.

(3) Thus the verb built by *I-* from *vidy* assigns theta roles to the arguments of VIDY ("BUY"). It also determines which of the two arguments stands in the BUY relation to the other.

Tense marking in Malagasy combines directly with verbs to form tensed verbs. The past tense function *N-* takes *ividy* to *nividy* (Future *H-* takes it to *hividy*, Present *M-* to *mividy*). We note the category of *nividy* simply as $S[NP_{nom}, NP_{acc}]_{pst}$, often omitting the tense subscript since we focus here on voice. Semantically expressions of this category map objects y to functions mapping objects x to functions sending temporal intervals τ to True or False, subject to the condition that if the value is True then τ is *prior* to *NOW*, where the temporal priority relation and the fixed interval *NOW* are part of the model structure for Malagasy.

Finally we treat PPs like *hoan-dRaso* 'for Raso' in (1a) as Predicate Modifiers (PMs). Syntactically they combine with (tensed) predicates of various categories to yield tensed predicates of the same category. Semantically they are restricting functions from tensed predicate denotations to tensed predicate denotations. To say that *F* is *restricting* here (see Keenan and Faltz 1985 for details) is to say that if $F(P)(b)(a)(\tau) = \text{True}$ then $P(b)(a)(\tau) = \text{True}$. So 'for Raso' is restricting since if Rabe bought the hat for Raso we can infer that he bought the hat. And prepositions like 'for' combine with NPs to make PMs; semantically they denote in $Den(\text{Prep})$, the set of functions mapping NP denotations to restricting maps from n -ary relations (possible predicate denotations) to n -ary relations. Our analysis of (1a) can be summarized in the following standard tree diagram:



In semantically interpreting complex expressions we have designed the denotations of expressions in such a way that whenever an x and a y combine to form a z then one of x, y is interpreted as a function and the other is interpreted as something in its domain. And we here stipulate in such a case that the interpretation of the derived expression z is the value of that function at that argument. In the examples considered in this paper we in general chose NPs which we can think of as denoting objects². Thus if *ilay satroka* 'that hat' denotes an object b , the denotation of *nividy ilay satroka* will be represented as **nividy**(b) where boldface **nividy** is the function which interprets *nividy*. Thus the semantic interpretation of (4) = (1a) is given by:

(5) $((\text{hoan-dRaso})(n(i(\text{vidy}))))(\text{ilay satroka})(\text{Rabe})$

Observe that our semantic interpretation of (1a) is strictly compositional: Each constituent is assigned a

meaning (=interpreted) and a derived constituent is always interpreted as function of those it is built from.

Observe also that the predicate built by *I-* plus the fully general function-argument interpretation of complex expressions guarantees that it is the referent of the nominative NP *Rabe* in (4) that is assigned the AGENT theta role. Generalizing AGENT to mean highest ranking on the order AGENT > EXPERIENCER > THEME/PATIENT, we may say that the verbal affix *i-* assigns AGENT to its nominative NP. Verbal affixes whose functions have this property will be called **active** affixes. A great many observable properties distinguish such nominative NPs, NP_{nom,S}, from the rest of the sentence. For example they have a distinctive pronominal form: *izy* (3sg/pl) as opposed to accusative *azy* and genitive *-ny*. They are sisters to the the Predicate Phrase which consists of the verb together with its adverbials and accusative and genitive arguments. For more tests see Keenan (1995).

Extending the analysis The domain of *I-* is just roots, and this set is, again, defined by listing. Moreover from the impressive empirical work of Abinal & Malzac (1888) and Rabenilaina (1985) we have a very good knowledge of the elements on this list. Second, we note that *I-* does not always form transitive verbs. It often does, *mikarakara* 'to take care of', *mifidy* 'to choose', *mikapoka* 'to beat' (Here and later we give verbs in their present tense form) but it often also builds intransitive verbs – *mitomany* 'to cry', *mitsiky* 'to smile', *milomano* 'to swim'. So *I-* is a function defined by conditions. If the root it applies to has a theta grid like {AG,TH} with two theta roles to assign then the value of *I-* at that root is a transitive verb. But if the grid is of the form {X} with just one role then the value of *I-* at that root is intransitive. In other words the number of arguments of the predicate *I-* derives matches that of the theta roles in the grid of the root, thus satisfying the Theta Criterion.

There are many active affixes, all prefixes, in the sense defined above. We call an affix *primary* if its domain consists solely of roots (and is thus definable by listing). The other common primary affix is *AN-*. Most commonly *AN-* builds transitive or ditransitive verbs – *maneho* 'to show', *mamono* 'to hit/kill', *mandidy* 'to cut', but it also builds some intransitive verbs – *mandihy* 'to dance', *mandainga* 'to tell lies', *mandeha* 'to go', *mandohalika* 'to kneel', *maniry* 'to mature'. A less widely used primary active affix is *A_r-*, which yields forms like *matory* 'to sleep' and *mahita* 'to see'. Some roots are in the domains of both functions, in which case the value of *I-* is normally intransitive and that of *AN-* (di-)transitive: *milatsaka* 'to fall' vs *mandatsaka* 'to drop'; *miseho* 'to appear, happen' vs *maneho* 'to show'.

Other, non-primary, active affixes take verbs built from *I-*, *AN-* and *A_r-* as arguments and add some additional meaning: *AMP-* causative, *IF-* reciprocal, *IHA-* inchoative, *AHA-* causative/abilitative.

passive verbs The passive verb *vidina* is derived by applying the function *-INA* to the root *vidy* (which, like proper suffixes in general, shifts stress: *Vidy* → *viDina*). It has category S[NP_{nom}, NP_{gen}]. Tense marking puts it in the past tense and the result combines first with a genitive NP and then with a nominative NP to yield an S. Thus *novidin-dRabe* 'is bought by Rabe' is a constituent in (1b); it combines with a nominative NP to make an S. Semantically we interpret *vidina* as a function mapping an object *x* to a function taking an object *y* to True iff THEME(*y*,VIDY) & AGENT(*x*,VIDY) & VIDY(*x*,*y*). *-INA*, like non-active affixes in general, assigns the ranking theta role to the genitive argument. In *-INA* passives the nominative NP is usually assigned a THEME or PATIENT role.

And one computes directly that **nividy**(b)(a) = **novidina**(a)(b). Thus active and passive pairs like (6a,b), built with individual denoting NPs, have the same truth conditions, though neither is derived from the other; rather each is built directly from the root.

- (6) a. Nividy ilay satroka Rabe 'Rabe bought that hat'
 b. Novidin-dRabe ilay satroka 'That hat was bought by Rabe'

Observe that we treat the genitive Agent phrase as an argument of the passive verb. More will have to be said

about the interpretation of such verbs when no genitive NP is present, but various authors support taking these passives predicates as of the same arity as the corresponding active. Thus textbooks of Malagasy most commonly illustrate passives with an Agent phrase; Randriamasimanana (1986) states that the Agent phrase is obligatory in past tense passives (built from *N-*); and the extensive text counts done by K&M (Keenan and Manorohanta; in prep) show that over 60% of the non-actives in texts present an overt Agent phrase. By contrast the thorough text counts in Stein (1979) show that in German only 17.6% of passives present Agent Phrases. The figures for English run from 13% to 20% (Svartvik 1966, Duskova 1971, Givon 1979).

Moreover the 60% figure for Malagasy is inaccurately low since many overtly agentless passives have their missing Agent controlled. Contexts like (7b) are common.

- (7) a. Mikasa hamaky io boky io ny mpianatra tsirairay
 intends(act) fut+read(act) that book that the student each
Each student intends to read that book
- b. Kasain'ny mpianatra tsirairay ho vakina io boky io
 intend+pass'the student each fut+read+pass that book that
That book is intended by each student, to be read (by him.)

Another type of case is illustrated by the first conjuncts in (8a,b), counted by K&M as agentless but whose Agent is clearly understood to be that of the second conjunct.

- (8) a. A+tao+ko fa voa+jery sy voa+dinika+nao (= voadinikao) tsara ireo sary teo
 pass+do+1sg that pass+see and pass+examine+2sg good those pictures there
I think that those pictures there have been seen (by you) and examined well by you [VR]
- b. araka izao ahitana sy ahafantaranareo ahy izao
 according that see+circ and know+circ+2pl me that
according to that which is seen and understood by you of me [VR]

Secondly, contrary perhaps to expectations based on current theories, the most common type of Head+Complement structure in Malagasy is one in which the Complement is genitive. It is the dominant case selected by Ns, As, and Ps. Vs divide on the issue. Formally, genitive NPs are morphologically bound to their hosts by a complex process I call *n-bonding*, exemplified but not defined below (for lack the space).

n-bonding combines a host H and an NP_{gen} α to form an expression **nbond**(H,α) whose category depends on that of H. E.g. if H is a Prep then the category of **nbond**(H,α) is PP. The precise form of **nbond**(H,α) depends on whether H is "weak" (= ends in *-na*, *-ka*, *-tra*, stressed on the antepenult) or not. Weak endings are dropped or modified according as NP_{gen} is a pronoun, an augmented pronoun, a coordinate NP, or a full NP beginning with a vowel, the proper noun articles *Ra-* or *i-*, or the definite article *ny*. If H is not weak, a segment *-n-* is inserted between it and a non-pronominal NP_{gen}. NP_{gen}s occur as Possessors of Ns, (9a), complements of transitive N's, (10), objects of most prepositions, (11), complements of most adjectives, (12), and Agent NPs with non-active predicates: (9b), (8a,b), (7b), (1b,c). (*nr* ⇒ *ndr* is phonologically regular).

- (9) a. trano ity trano + n + Rabe (= tranon-dRabe) ity b. a+roso+n+Rabe (arosan-dRabe)
 house this house+gen+Rabe this pass+serve+gen+Rabe
this house of Rabe's *served by Rabe*

Note that Possessor's do not compete for position with Dets. They do compete somewhat with Adjectives modifying the head, and their joint presence is often felt as awkward even when acceptable. Adjectives may always follow and sometimes (e.g. inherent property Adjectives; Jan Voskuil, p.c.) precede NP_{gen}:

- (13) a. [N+an+tolotra (Nanolotra) vary (hoan')ny vahiny t+amin'ny lovia vaovao] aho
 past+act+present rice (to)'the guest past+on'the dishes new 1sg(nom)
I presented rice to the guests on the new dishes
- b. [N+a+tolotra+ko (Natolotro) (hoan')ny vahiny t+amin'ny lovia vaovao] ny vary
 past+pass₁+present+1sg(gen) (to)'the guests past+with'the dishes new the rice
The rice was presented by me to the guests on the new dishes
- c. [No+tolotra+ana+ko (Notolorako) vary t+amin'ny lovia vaovao] ny vahiny
 past+offer+pass₂+1sg(gen) rice past+with'the dishes new the guests
The guests were presented rice on the new dishes by me
- d. [N+an+tolotra+(C)ana+ko (Nanolorako) vary (hoan')ny vahiny] ny lovia vaovao
 past+act+ present+circ+1sg(gen) rice (to)' the guests the dishes new
The new dishes were presented rice on to the guests by me

In addition to *a-* prefix passives there are also *voa-* and *tafa-* prefix passives, *voa-* being illustrated in (8a).

Finally, the second most commonly occurring type of passive in Keenan and Manorohanta's study were root passives. Thus the lexical item *resy* 'defeated' takes its Agent as a genitive complement and its Patient as nominative (14a). Applying the active *AN-* function yields a derived active verb with nominative Agent and accusative Patient.

- (14) a. Resin'ny fanjakana ny fahavalo
 defeated+by'the government the enemies
The enemies were defeated by the government
- b. N+an+resy (nandresy) ny fahavalo ny fanjakana
 past-active-defeat the enemies the government
The government defeated the enemies

On the view presented here items like *resy* are entered in the lexicon in the category $S[NP_{nom}, NP_{gen}]$. Semantically they map an object *b* to a function mapping an object *a* to True iff $THEME(a, RESY) \& AGENT(b, RESY)$ and $RESY(b, a)$. And the domain of *AN-* is extended to take such roots in its domain. *AN-* applied to *resy* yields as value *-andresy* of category $S[NP_{nom}, NP_{acc}]$ interpreted as a function mapping an object *y* to a function mapping *x* to True iff $THEME(y, RESY) \& AGENT(x, RESY) \& RESY(x, y)$. Again paraphrase between active and passive Ss (with individual denoting NPs) is assured. Other examples of root passives include ones translatable as *understood, caught, perceived from afar, cured, damaged, heard, seen*.

Lastly we turn to the circumstantial forms of verbs exemplified in (1c). Here a function *-ANA* suffixes a tenseless active verb, not a root, with *-(C)ana*, where the presence and choice of consonant *C* varies with the choice of root, and the final syllable *-na* is occasionally reduplicated. The value of *-ANA* at the active *ividy* is *ividianana*, with stress shift and reduplication of *-na*. Its category is $S[NP_{nom}, NP_{acc}, NP_{gen}]$. Thus (1c), repeated as (15) below has the constituent bracketing indicated:

- (15) [[[N + [[i + vidy] + anana]] + Rabe] (= nividianan-dRabe) [ilay satroka]] Raso
 past+active+root+circumstantial+Rabe that hat Raso
Raso was bought +for by Rabe that hat

Semantically the interpretation of *-ANA(ividy)* is given by: $-ANA(ividy)(c)(b)(a) = \text{True}$ iff for some *f* in $Den(Prep)$, $f(a)(ividy)(b)(c) = \text{True}$. Since $f(a)$ is restricting this guarantees that $ividy(b)(c) = \text{True}$ and thus that *b* is the THEME of VIDY and *c* is the AGENT.

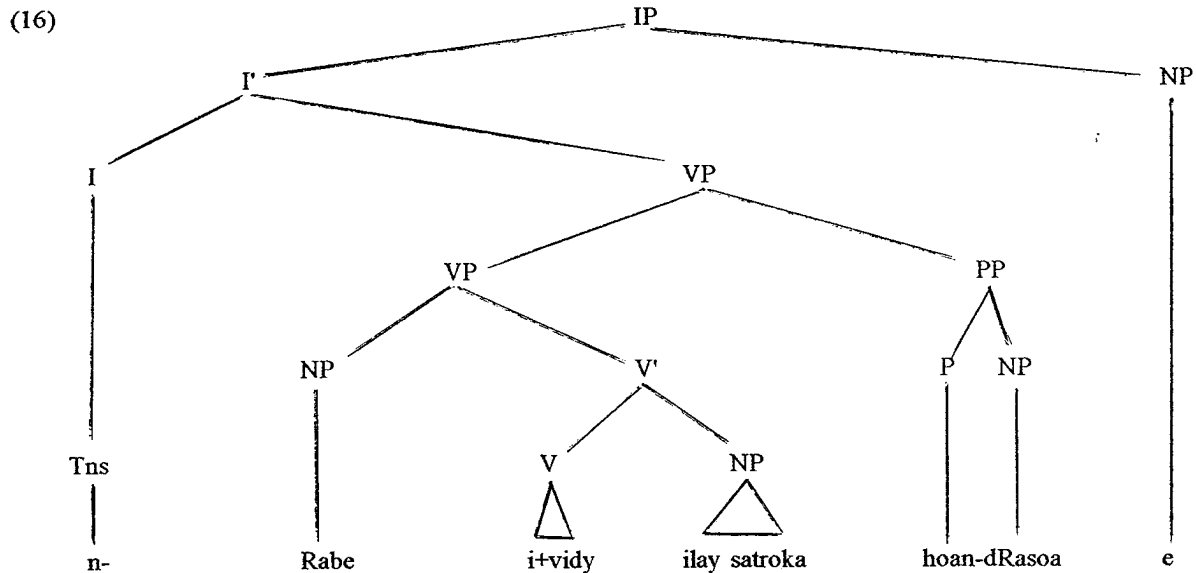
Less formally this semantics says that the circumstantial form **buy** maps (Rabe)(that hat)(Rasoa) to True iff there is some function *f* of the sort denotable by prepositions such that *f*(Rasoa)(**buy**(that hat)) is true of Rabe. *f* could be something like FOR, WITH, BY MEANS OF, etc. In context an appropriate value is chosen.

Circumstantial verbs are like passives in that the genitive NP is assigned the AGENT role. But in distinction to passives, NP_{nom} is usually assigned an oblique role – benefactee, instrument, source, goal, manner, ... (Rajemisa-Raolison lists some 13 oblique roles that the NP_{nom} of a circumstantial verb may have). Moreover for a given root the circumstantial form of an active verb has one more argument than that active (or its passive counterpart). There are no root circumstantial verbs and the domain of the (only) circumstantial function, ANA is just active (tenseless) verbs, not roots. Even the few active roots must take a prefix before they can be put in a circumstantial form. Thus the circumstantial form of *tonga* 'arrive' is *ahatongavana*, from (m)aha+tonga. Note also that different active verbs built from the same root all have their own circumstantial forms. E.g. from the root *soratra* 'writing' we have

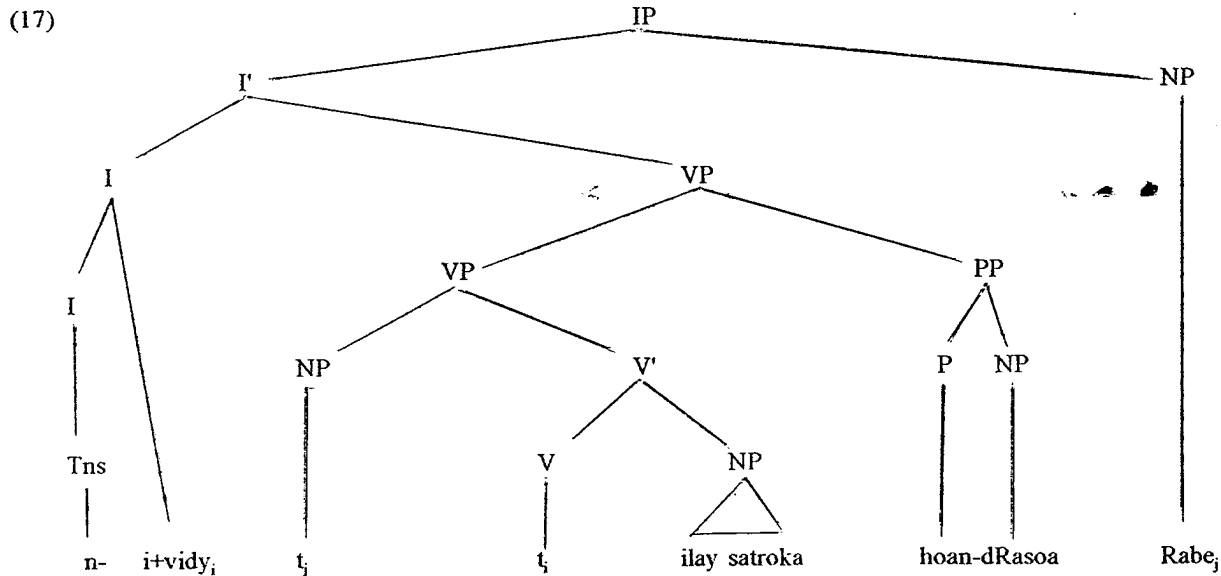
<i>Active</i>	<i>Circumstantial</i>
m+an+ <i>soratra</i> = <i>manoratra</i> 'writes'	anoratana 'writes for/with...
m+if+an+ <i>soratra</i> = <i>mifanoratra</i> 'write each other'	ifanoratana 'write each other for/with...
m+amp+if+an+ <i>soratra</i> = <i>mampifanoratra</i> 'causes-write each other'	ampifanoratana 'causes-write e.o. for/with...'

II. A generic GB analysis

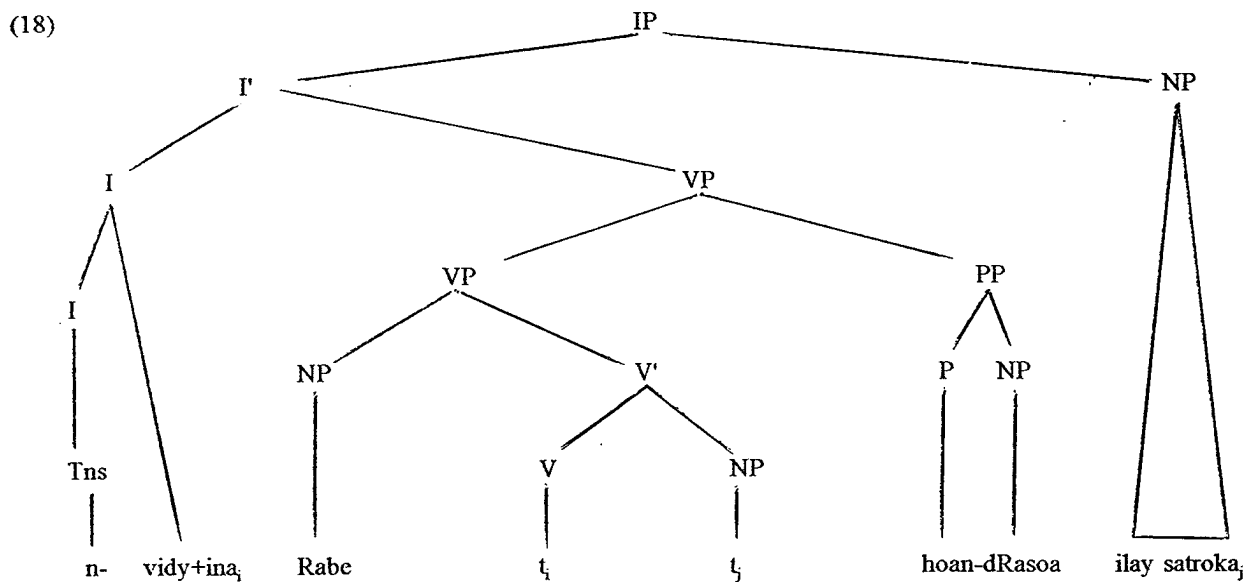
Adapting proposals in GHT an underlying structure for (1a) might be as in (16).



Here the language specific role of the language specific verbal morphology *i-* (GHT actually used a verb with an *an-* prefix) is to assign case to the postverbal NP *ilay satroka* 'that hat'. The Agent NP *Rabe* is in the preverbal "English" position and is not assigned case (whence (16) as it stands cannot surface). The external NP position is empty. The verb *i+vidy* can adjoin to I (Infl) (or some other functional projection) and the NP *Rabe* can move to the external NP position where it is assigned case. The resulting structure is as in (17).

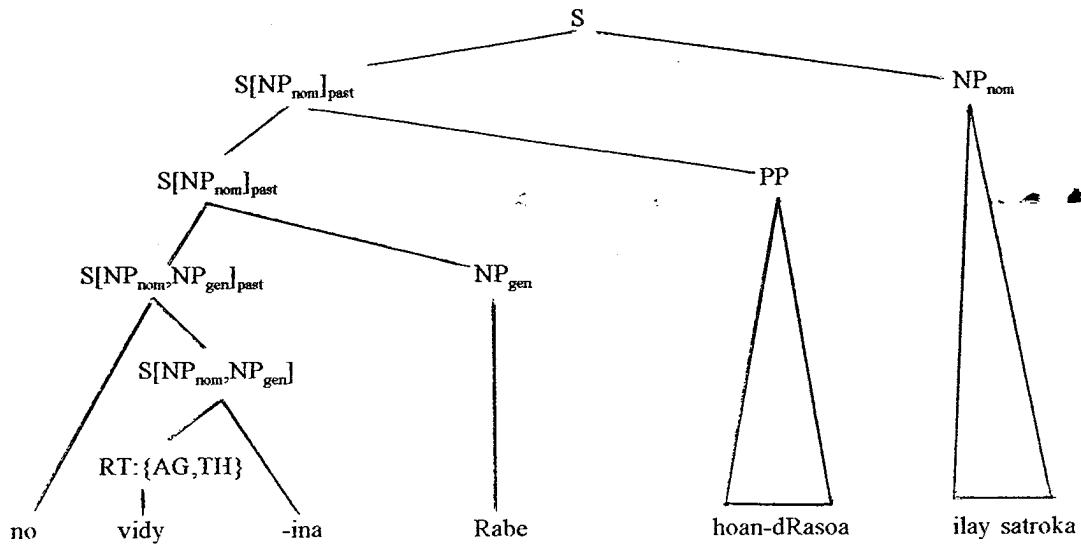


The gross constituent structure of (17) compares fairly well with ours, (4), save that (4) presents no empty nodes and no indexing. More interesting differences show up in the non-actives. On the GB analysis the underlying structure for the *-ina* passive would be the same as (17) except the verb root *vidy* would carry the suffix *-ina* instead of the prefix *i-*. Again a language particular stipulation (associated with language particular morphology) would say that *-ina* assigns case to the preverbal NP *Rabe*. As nothing assigns case to the postverbal NP the underlying structure as given cannot surface. But under V to I movement, if the postverbal NP moves to the external NP position it is assigned case, as in the active. The resulting structure is:



This structure differs rather more from the one we proposed. In ours, illustrated in (19), the Agent NP *Rabe* forms a constituent with the verb *vidina* to the exclusion of the other complements of the verb, whereas in (20) *Rabe* forms a constituent with the other arguments and modifiers of the verb to the exclusion of the verb.

(19)

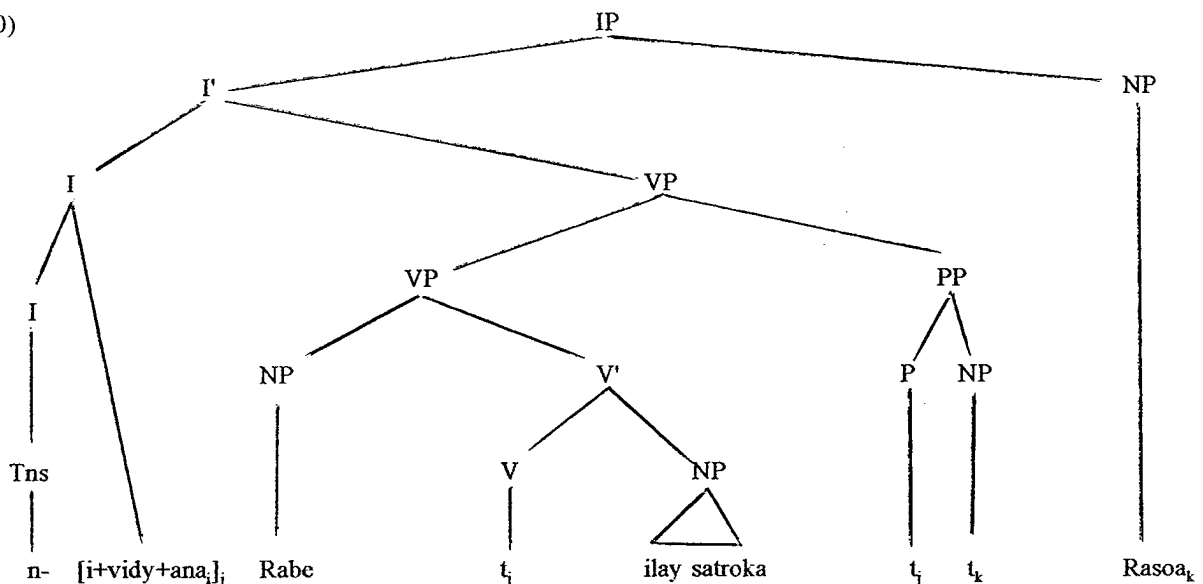


Finally, the generic GB analysis of circumstantial forms like (1c) is the least well developed in the literature. GHT suggest an underlying structure like (16) except that both the active and the passive morphology are present, in which case, in accordance with their previously given stipulations, both the Agent NP and the Theme NP are assigned case. So moving either of them to the external position is unmotivated.

In general however the circumstantial form of a verb is not given by simultaneous presence of active and passive morphology (though this does happen in some cases, among them the one GHT looked at). But this proposal was never viable for the prefix (*a-*, *voa-*, and *tafa-*) and root passives, and in general fails for the suffix passives. A typical case here is: root *haja* 'respect'; act. (*m*)*anaja*; pass. *hajaina*; circ. *anajana*.

So let us modify their proposal as follows. Let the underlying structure for the circumstantial (1c) be as with the active (1a), and let us posit a Preposition Incorporation (Prep-Inc) operation which eliminates the Prep *hoan* - 'for' incorporating it in the form of (*C*)*ana* on the verb and assigning case to the preverbal NP, leaving its object NP *Rasoa* caseless, whence, as before, the structure is saved by moving *Rasoa* into the external NP position where it gets case. So the resultant structure for (1c) would be something like (20):

(20)



Again, aside from the empty categories, this structure differs from ours in that the Agent NP *Rabe* does not form a constituent with the verb *nividianana*. We turn now to a comparison of the two approaches.

III Predicate Building (PB) and generic GB approaches compared

1. Semantics Only the PB approach provides a compositional semantics. Thus it accounts for how complex expressions are interpreted as a function of what they are built from and so gives some idea how little learners of Malagasy could interpret complex expressions once they knew the meanings of the lexical items they were built from and how they were built from those items. In particular the PB approach explicitly accounts for which NPs bear which theta roles in the different Ss, and these are the primary facts which motivate us as linguists to say that these Ss stand in some derivational relation to each other.

2. Voice morphology The PB approach provides a uniform interpretation of the voicing morphology. "Active" morphology, like the primary prefixes *i-*, *an-*, and the secondary ones like *amp-* build verbs which assign the AGENT semantic role to the nominative NP. Non-active morphology assigns AGENT to the genitive NP. Circumstantials are distinct from passives in building on active Vs³.

By contrast on the GB approach sketched here, there is no uniform role for the primary active morphologies *i-* and *an-*. In many cases they will assign case to the postverbal NP, but this is not possible for the many cases in which they build intransitive verbs.

Also, attributing the circumstantial morphology to the result of Prep-Inc is unappealing (though not impossible). For one thing the more than 30 semantically distinct prepositions given in Rajemisa-Raolison (1971) would collapse to the same (C)ana morphology massively violating Recoverability of Deletions. Prep-Inc thus predicts that circumstantial Ss (ones whose main verb is the value of the *-ANA* function) are massively ambiguous. My own judgment here is that such Ss are not ambiguous, but merely vague. Thus from (21) all we know is that *Raso* plays some circumstantial role in the action. On hearing (21) we choose a role for *Raso* that is appropriate in context, such as benefactee, proximate cause, etc. But we cannot force the kind of double-take reaction we get with Ss like *Flying planes can be dangerous* or *The chickens are ready to eat*.

(21) *Raso* no *nividiananay* azy
Raso Foc past+buy+circ+1pl.excl.gen it (acc)
It was Raso Prep-whom we bought it

Further circumstantial Vs are used in a variety of cases in which the nominative would not be governed by a Prep in the active. Here are five: One, some roots simply do not take any passive affix but do form active transitive verbs. But NP_{nom} in the circumstantial forms of these latter is assigned THEME/PATIENT.

(22) a. *Mianatra teny vahiny Rabe* b. *ny teny vahiny ianaran-dRabe*
studies(act) language foreign Rabe *the language foreign studied(circ)+by+Rabe*
Rabe studies foreign languages *the foreign languages studied by Rabe .*

Two, various adverbials when focussed may trigger circumstantial morphology even though the adverbial itself in the active would not be constructed with a preposition.

(23) a. *Tonga omaly Rabe* b. *Omaly no nahatongavan-dRabe*
arrived yesterday Rabe *Yesterday Foc past+aha+arrive(circ)+by+Rabe*
Rabe arrived yesterday *It was yesterday that Rabe arrived*

(24) a. *Mivarotra mora ny mpivarotra amin'io andro io*
sell(act) cheap the sellers on'that day that
The sellers sell cheap on that day

- b. Mora no ivarotan'ny mpivarotra amin'io andro io
 cheap Foc sell(circ)+by'the sellers on'that day that
It is cheap that the sellers sell on that day

(A referee notes that we might save the GB analysis here by positing null prepositions governing 'yesterday' and 'cheap'. But this seems a costly move: why should the incorporation of zero phonology change the phonology of the host? How do little Malagasy learn to recognize the presence of prepositions in the absence of sensory stimulation? And have we not removed the empirical content of the claim that +circ morphology arises from Prep Inc? This would allow that subjects of circumstantial verbs were never constructed with an overt preposition in active Ss.)

Third, a THEME/PATIENT presented as only partially affected may be the NP_{nom} of a circumstantial verb.

- (25) a. Namono ny akoho Rabe
 killed(act) the chicken(s) Rabe
Rabe killed the chicken(s)
- b. Namonoan-dRabe ny akoho
 killed(circ)+by+Rabe the chickens
Some of the chickens were killed by Rabe

Fourth, a THEME/PATIENT of a circumstantial reciprocal verb is presented as its NP_{nom}.

- (26) a. N+if+an+soratra (= Nifanoratra) taratasy Rabe sy Raso
 past+rec+act+write letters Rabe and Raso
Rabe and Raso wrote letters to each other
- b. N+if+an+soratra+ana+Rabe sy Raso (=nifanoratan-dRabe sy Raso) ireto taratasy ireto
 past+rec+act+write+circ Rabe and Raso these letters these
These letters were written to each other by Rabe and Raso
- c. ireto taratasy (izay) nifanoratan-dRabe sy Raso ireto
 those letters (that) wrote+to+each+other+by+Rabe and Raso those
those letters that were written to each other by Rabe and Raso

Fifth, in focus constructions the preposition may sometimes be present:

- (27) Tamim-kafaliana no nahitako azy
 with(past)-happiness Foc past+see(circ)+1sg(gen) him
It was with joy that I saw him

Finally the Prep-Inc mechanism itself is not adequate to the task. It cannot be obligatory since Preps with their objects surface regularly in Ss built from verbs in all voices, including circumstantial ones.

- (28) Lafo no ividiananay azy amin'ny mpamboly
 expensive Foc is+bought(circ)+by+us them from'the growers
It is dear that we buy them from the growers

Thus it seems that nothing forces Prep-Inc to apply in structures like (16), whence something more must be said concerning why it cannot surface as it is.

Further, even if the (C)ana suffix is represented as the result of Prep-Inc it does not seem motivated to say that the prepositionless NP lacks case. In overt case marking languages like Latin and Greek in which a preposition may occur either on the NP or on the verb we see that the prepositionless NP still has case. Thus in (29a) from Homeric Greek (Gary and Keenan, 1977; examples due to E.J.W. Barber, pc) the preposition *en* (or *eni* as a postposition) assigns dative case, and when it is incorporated in the verb as in (29b) the relevant NP is still

constituency tests.

First, tensed transitive verbs coordinate commonly and easily in Malagasy. From a short first grade reader I picked up 8 examples. Such coordination is natural on the PB view since tense marking forms a constituent directly with the verb, not merely with the verb plus its complements⁴.

- (34) Nividy sy namaky boky roa Rabe
 bought and read book two Rabe
Rabe bought and read two books

The only reading of (34) is one on which there are two books each of which was bought and read by Rabe

We might plausibly GB-derive (34) from a coordinate IP (or appropriate FP for some functional category F) by first raising each verb in each conjunct to its I (F) yielding, with English morphemes for readability, [[*past+buy* [*Rabe e book two*]] and [*past+read* [*Rabe e book two*]]]. Then Conjunction Reduction (CR) applies yielding [[*past+buy and past+read*][*Rabe e book two*]] and then movement of *Rabe* to Spec IP yielding (35). The PB analysis only requires generalized coordination for expressions of the same category C, in particular for C = S[NP_{nom}, NP_{acc}] (Keenan & Faltz, 1985). Simplicity favors the PB approach here (and does not require defining CR).

More importantly however the underlying structure the GB analysis assumes is not the structure on which semantic interpretation will be determined, as the S has no reading on which it means *Rabe bought two books and Rabe read two books* (which allows that the books he bought be different from those he read). So the GB approach will have to provide a second analysis for (34) to get the semantic interpretation right. Under any reasonable definition this is *uneconomical*.

We might emphasize here that Ss like (34) read easily and naturally. They have for example nothing of the flavor of non-constituent coordination which we see in e.g. *John bought and Bill cooked the turkey*. Similarly simple Ss like (35) with an adverb scoping into a coordinate predicate read easily in Malagasy.

- (35) Fantatro sady hitako tsara izany
 known-my and seen-by-me good that
That is known by me and recognized by me well

The coordination facts provide then one reason for preferring tense marking to form a constituent directly with the verb in Malagasy. Note further (36) – (40) that predicates of different tenses and voices coordinate.

- (36) Inona no Ø+iriko sy h+aha+finaritra ahy mihoatra noho izany?
 What foc pres-desire(pass)+my and fut+cause(act)+pleasant me exceed than that
What is it that I desire and will please me more than that? [VR]

- (37) Nosoratako sy ho tiako mandrakariva io tononkalo io
 pst+write(pass)+1sg and fut+pass+like+me always that poem that
That poem was written by me and will always be liked by me

- (38) ny tanana izay malaza amin'ny loharanony sy nifankahitantsika voalohany
 the village that pres+famous for'the spring+its and pst+rec+see(circ)+1pl first
the village that is famous for its springs and (where) we saw each other for the first time

- (39) Inty ny tanana nahaterahako sy honenako mandrakariva
 Here+is the village pst+born+circ+me and fut+live+circ+me always
Here is the village where I was born and where I will always live

(40) Zavatra mahatsiravina sy nanaitra ny sain'ireo zatovo roa lahy tanora fanahy ireo loatra
 thing (which) disgusts and shocked the minds'of those young men young minded those too+much

izany fialan'aina hitany izany
 that removal+of+life seen by them that

*That death they saw is a thing which sickens and shocked the minds of those two young young minded men
 too much* [IKM]

However cases which most crucially support the PB analysis are ones in which the non-active predicate with its Agent phrase coordinates with transitive verbs taking the same object. Observe that on the PB view the circumstantial form of (past tense) 'buy', *nividianana*, has category S[NP_{nom}, NP_{acc}, NP_{gen}]. So once it combines with its genitive complement we have a two NP-taking predicate of category S[NP_{nom}, NP_{acc}], the same category as active 'read', *namaky*. Here are two such cases (the first simplified from a first grade reader!).

- (41) a. Nividianako ilay boky ianao
 pst+buy(circ)+1sg(gen) that book you
You were bought that book by me
- b. Namaky ilay boky ianao
 pst+read(act) that book you
You read that book
- c. Nividianako sy namaky ilay boky ianao
 pst+buy(circ)+1sg(gen) and pst+read(act) that book you
You [[were bought+for by me and read] that book]

- (42) a. Nanondroako ilay toerana ianao
 pst+point+out(circ)+1sg(gen) that place you
You were indicated that place by me
- b. Nanondroako ka naka ilay toerana ianao
 pointed+out(circ)+1sg(gen) and so took(act) that place you
You were pointed out by me and took that place

On the PB approach the same rules that coordinate transitive verbs apply to generate the coordinations here. On a GB approach the only derivations I can think of are elephantine. We begin with underlying structures like (43).

(43) [[tense [v_p1sg [buy that book for-you]]] and [tense [you [read that book]]]]

To my knowledge there are no rules which will reduce the coordination at this point. However, applying Prep-Inc in the first conjunct, then applying V to I movement in each conjunct, then moving the caseless NP to Spec IP in each conjunct would yield (44):

(44) [[[bought(circ) [v_p1sg [e that book e]]] you] and [[read(act) [v_p e [e that book]]] you]]

Presumably RNR (Right Node Raising) could apply to (45) yielding

(45) [[[[[bought(circ) [v_p1sg [e that book e]]] e] and [[read(act) [v_p e [e that book]]] e]] you]

But in order to get from (45) to (41c) we would have to look inside the coordinated non-maximal IPs in (45) to

the VP level and apply some form of across the board movement (RNR does not apply). This movement is not otherwise attested in languages and strongly violates any form of strict cyclicity. Again Naive Economy ("If you don't need it don't buy it") rejects such backtracking in favor of the PB approach.

Finally we note that whether nominalized (46) or tensed, (47) and (48), coordinated circumstantial Vs + Agent Phrase with a common direct object combine with determiners to form argument expressions, further supporting their status as constituents. The examples are all taken from Malagasy novels or short stories.

(46) izany f+ikarakarany sy f-anolokoloany an-dRazay izany
 that nom+care(circ)+3(gen) and nom+treat(circ)+3(gen) acc-Razay that
that care of theirs and treatment of theirs of Razay [IKM]
 (= "their care and treatment (of) Razay")

(47) araka izao Ø+ahitana sy Ø+ahafantaranareo ahy izao
 according that pres+see(circ) and pres+know(circ)+2pl(gen) me that
according to that which you see and understand of me [VR.43]

(48) Ela izay nitalahoako sy nangatahako zanaka izay
 long that pst+supplicate(circ)+1sg(gen) and pst+asked-for(circ)1sg(gen) child that
my supplicating and asking for a child has lasted long [Z]

Lastly we note a different constituency property which slightly favors a PB analysis over the GB one. Namely we get correct predictions concerning the interaction between complex predicates and Generalized Incorporation. Thus taking (49a) as a point of reference observe that in (49b) the object NP *baolina* incorporates into the agentless circumstantial verb. But this cannot happen if the verb is agented, (49c).

- (49) a. Milalao baolina ao an-trano Rabe
 play(act) ball there at-house Rabe
Rabe is playing ball in the house
- b. Tsy ilalaovam-baolina (< ilalaovana baolina) ny trano
 not play(circ)-ball the house
The house isn't played ball in
- c. *Tsy ilalaovam-baolina Rabe ny trano
The house isn't being played ball in by Rabe
- d. Tsy ilalaovan-dRabe baolina ny trano
 not play(circ)+Rabe ball the house
The house isn't being played ball in by Rabe

(49c) shows that, on the GB approach, the object cannot incorporate before the verb moves to Infl. But its structural description is met before verb movement, and the incorporation is allowed as (49b) shows, so by Naive Economy the incorporation should take place. So the GB approach is uneconomical here. On the PB approach by contrast one can stipulate in any of various ways that the presence of the NP Agent Phrase on the verb blocks incorporation.

Footnotes

1. More formally VIDY is a functional associating each universe E with a binary relation over E. So $\text{VIDY}(E) \subseteq E \times E$.

2. More generally NPs denote generalized quantifiers. See the analysis of Malagasy in Keenan (1995) and references cited there.

3. Voskuil (1993) rightly points out that a few verbs, clearly recognized as exceptional in traditional grammars, do form *-ina* passives from actives rather than the root. E.g. from *halatra* 'stolen goods' we have the active *mangalatra* 'steals' and the passive *angalarina* 'is stolen'. Also we note one systematic exception to the claim that the domain of *-INA* is only roots. Namely it productively takes *AMP-* causatives in its domain. Thus from the root *asa* 'work' we have the active *miasa* 'to work', the causative *mampiasa* 'to cause to work, use' and the suffix passive *ampiasaina* 'to be used'.

4. The function-argument combination rules for Predicates and Arguments passes along the tense feature:
 $S[NP_1, \dots, NP_{k+1}]_t + NP_{k+1} = S[NP_1, \dots, NP_k]_t$

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