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HPSG, GB, and the Balinese Bind

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1. The Myth of the Notational Variant

In comparing two analyses of the same phenomenon within HPSG and GB (Government/Binding theory or its descendants such as Principles and Parameters and Minimalism), one sometimes finds a rough parallelism between the descriptive mechanisms of each theory.¹ (Such parallel analyses are occasionally incorrectly referred to as ‘notational variants’.) While parallelism is not surprising when the object of inquiry is identical, such cross-framework comparisons are nevertheless valuable.

However, as will be shown below, the apparent parallelism in simple cases can mask crucial underlying differences which lead to radically divergent empirical consequences when the data set is extended. This paper is a case study in the illusion of parallelism between HPSG and GB. The empirical basis for this study is the interaction of voice-marking and anaphoric binding in Balinese (Austronesian), as described in joint work

¹All of the descriptive work and much of the analysis for this paper was carried out in collaboration with Wayan Arka. For their comments and discussion I wish to thank Lisa Travis, Knud Lambrecht, Jean-Pierre Koenig, and Ralph Blight. I am also grateful to an anonymous NLLT reviewer (of Wechsler and Arka 1998), who, as a mythologist of the notational variant, provided the initial inspiration for this paper.

conducted with I Wayan Arka (Arka, in progress; Arka and Wechsler, 1996; Wechsler and Arka, 1996, 1997a, 1997b, 1998). First I will present our HPSG analysis as well as the ‘standard’ GB analysis of Austronesian voice-marking, the latter based on Guilfoyle, Hung, and Travis (1992) (see also Bittner and Hale, 1996). I will point out the close parallels between the two approaches and show that they handle basic anaphoric binding facts equally well. Then I will expand the data set to include raising constructions. There we will see as radical a divergence as one can imagine. The HPSG analysis extends automatically to cover such constructions, while the GB analysis runs into serious problems: not only does it fail to extend properly, it cannot be modified to allow for the extension without an overhaul of basic tenets of GB binding theory.

2. Balinese voice-marking and binding

Like many of its Austronesian relatives, Balinese has a voice system (sometimes called ‘focus-marking’) whereby morphology on the verb determines which argument is selected to be the subject. Balinese verbs can appear in either of two voices: (i) Objective Voice (OV) which is morphologically unmarked as in (2)a; and (ii) Agentive Voice (AV) which is formed by substituting a homorganic nasal for the stem-initial consonant or prefixing *ng-* [ŋ] to a vowel-initial stem, as in (2)b. Intransitive verbs are unmarked, as in (1).

- (1) Ia pules.
3rd sleep
(s)he is sleeping.
- (2) a. Bawi adol ida.
pig OV.sell 3sg
'(s)he sold a pig'
- b. Ida ng-adol bawi.
3sg AV-sell pig
(s)he sold a pig

(3rd = third person pronoun, unmarked for number or gender). Notice that the voice marking determines the order of arguments: the OV sentence has the order Theme-Verb-Agent, while the AV sentence has it Agent-Verb-Theme. We have argued elsewhere that the preverbal NPs in (2)a and b are the surface subjects and the postverbal ones are complements, so that Balinese canonically has SVO order, regardless of whether the verb is OV or AV (Artawa, 1994; Wechsler and Arka, 1998). In other words, (2)a and b are not just word order variants; rather, the voice markers regulate the mapping between arguments (agent, theme, etc.) and grammatical relations (subject, object, etc.). Our evidence for this view is quite extensive,

drawing on relativization, Subject-to-subject raising, Subject-to-object raising, Control, Extraposition, quantifier float, and other phenomena in the syntax of Balinese. We will not review those arguments here, however, but refer the reader to Wechsler and Arka (1998).

3. HPSG analysis

The Balinese voice alternation can be described in HPSG by assigning an ARG-S value to each verb stem, then allowing the voice morphology to determine which ARG-S item maps to the SUBJ value. The term ‘A-subject’ refers to the first (leftmost) item in the ARG-S list (following Manning, 1994). The rules for Balinese subject selection are as follows. When the verb is in AV form, the A-subject maps to the SUBJect. For example, suppose the ditransitive (applicativized) verb stem *beliang* ‘buy for’ has the following ARG-S:

(3) verb stem *beliang* ‘buy for’:

$$\left[\begin{array}{l} \text{ARG-S} \langle \text{NP}_i, \text{NP}_j, \text{NP}_k \rangle \\ \\ \text{CONTENT} \left[\begin{array}{l} \textit{buy-rel} \\ \text{AGENT } i \\ \text{GOAL } j \\ \text{THEME } k \end{array} \right] \end{array} \right]$$

As seen in (3), the agent argument is the A-subject. The AV form of this verb takes the agent argument as its subject (in the AV form the homorganic nasal /m/ substitutes for the stem-initial /b/):

(4) Ia meli-ang I Wayan potlot-e ento.
 3rd AV.buy-APPL ART Wayan pencil-DEF that
 (s)he bought Wayan the pencil.

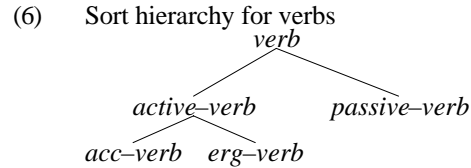
Also, for any intransitive verb, whatever its voice marking, the sole NP argument is the subject. On the other hand, the subject of a mono- or ditransitive OV verb is any term (NP) argument *except* the A-subject. Thus a ditransitive OV verb has two linking possibilities (in (5)a,b the agent is realized as the 3rd person pronominal clitic =a):

(5) a. Potlote ento beli-ang=a I Wayan.
 pencil-DEF that OV.buy-APPL=3 Art Wayan
 (s)he bought Wayan the pencil.

b. I Wayan beli-ang=a potlote ento.
 Art Wayan OV.buy-APPL=3 pencil-DEF that
 (s)he bought Wayan the pencil.

- c. *Ia beli-ang I Wayan potlot-e ento.
 3rd OV.buy-APPL Art Wayan pencil-DEF that
 (s)he bought Wayan the pencil.

These rules are formalized as follows. Verb signs are sorted as in (6).



For any verb (modulo pro-drop, pronoun incorporation, etc.) the SUBJ list contains one NP and the ARG-S value is the *sequence union* (\cup_{\diamond}) of the SUBJ and COMPS values (i.e. the non-SUBJ arguments are mapped to COMPS, preserving order):²

$$(7) \text{ verb: } \left[\begin{array}{l} \text{VALENCE } \left[\begin{array}{l} \text{SUBJ } \langle \mathbb{1} \langle \text{NP} \rangle \rangle \\ \text{COMPS } \langle \mathbb{2} \rangle \end{array} \right] \\ \text{ARG-S } \langle \mathbb{1} \cup_{\diamond} \mathbb{2} \rangle \end{array} \right]$$

Active verbs are sorted into accusative and ergative (passives will not be treated here, but are analyzed in (Wechsler and Arka, 1998)Wechsler and Arka 1998). For an accusative verb, the A-subject is the SUBJECT (8)a. The sort declaration for ergative verb, shown in (8)b, can be satisfied in either of two ways: (i) the verb is intransitive (only one NP in its ARG-S list); or (ii) any NP *except* the A-subject maps to SUBJ. (A negated description $\neg A$ is satisfied by any feature structure which fails to satisfy description A.)

$$(8) \begin{array}{ll} \text{a. } \textit{acc-verb}: & \left[\begin{array}{l} \text{SUBJ } \langle \mathbb{1} \rangle \\ \text{ARG-S } \langle \mathbb{1}, \dots \rangle \end{array} \right] \\ \text{b. } \textit{erg-verb}: & \neg \left[\begin{array}{l} \text{SUBJ } \langle \mathbb{1} \rangle \\ \text{ARG-S } \langle \mathbb{1}, \dots, \text{NP}, \dots \rangle \end{array} \right] \end{array}$$

See also Manning and Sag (1995) for a similar proposal. A crucial feature of this analysis of the AV/OV alternation is that the ARG-S list ordering is constant for a particular verb stem, irrespective of voice. In that respect the AV/OV alternation differs from the more familiar active/passive alternation,

²Given two lists L_1 and L_2 , the list $L_1 \cup_{\diamond} L_2$ contains all and only the elements of L_1 and L_2 , preserving ordering on L_1 and on L_2 but freely intermingling their elements. For example: $\langle a, b \rangle \cup_{\diamond} \langle 1, 2 \rangle = \langle a, b, 1, 2 \rangle \vee \langle a, 1, b, 2 \rangle \vee \langle a, 1, 2, b \rangle \vee \langle 1, a, b, 2 \rangle \vee \langle 1, a, 2, b \rangle \vee \langle 1, 2, a, b \rangle$. See Reape 1994.

which is typically analyzed in terms of a shuffling of the ARG-S list. For example, in (5)a,b above, the agent (the third person clitic =a) is still the first (leftmost) item in ARG-S, even though it does not appear as subject. In other words, while the agent is ‘demoted’ in the passive, the agent is not ‘demoted’ in OV.

Important evidence for this view comes from anaphoric binding, since binding is defined at ARG-S. As in many west Austronesian languages, anaphoric binding conditions in Balinese depend on argument role, and not on grammatical relations (see Andrews, 1985; Kroeger, 1993; Schachter, 1984, *inter alia*). In (9)a the subject binds the object while in (9)b object binds subject. But in each case, the agent can bind a theme (and not vice versa), irrespective of grammatical function.³

- (9) a. *Ida nyingakin ragan idane*
 3sg AV-see self
 ‘(s)he saw himself/herself’
- b. *Ragan idane cingakin ida*
 self OV.see 3SG
 ‘(s)he saw himself/herself’

As noted by (Manning, 1994), this follows straightforwardly on the HPSG theory of anaphoric binding (adapted from Pollard and Sag, 1992):

- (10) HPSG(3) Binding Theory
 Principle A. An a-commanded anaphor must be locally a-bound.
 Principle B. A personal pronoun must be locally a-free.
 Principle C. A non-pronoun must be a-free.

Definitions:

In the feature [ARG-S <...x,...y,...>], x is said to *a-command* y.

x *locally a-binds* y = x a-commands y, x and y coindexed

x *a-binds* y = x a-commands some z dominating y, x and y coindexed

x is (locally) *a-free* = x is not (locally) a-bound

In both (9)a and b, the SEER argument a-commands the SEEN, so the reflexive is locally a-bound in each sentence. (11) gives simplified HPSG lexical signs for *nyingakin* ‘see (AV)’ and *cingakin* ‘see (OV)’ as in (9)a and (9)b respectively (cp. Manning and Sag, 1995). Note that the ARG-S and

³Example (9) is in Balinese ‘high register’, while most of the other examples are in the low register. In the low register sentence corresponding to (9)b, the OV agent pronoun would be cliticized to the verb, so high register is used in order to simplify the descriptions in (11). ARG-S is identical irrespective of whether a pronoun is incorporated or free, so binding is unaffected by this distinction. Pronoun incorporation is analyzed in Wechsler and Arka 1996.

CONTENT features are identical across the two voices, while the VALENCE features differ:

- (11) a. *nyingakin* ('AV.see'): b. *cingakin* ('OV.see'):
- | | |
|---|--|
| $\left[\begin{array}{l} \text{PHON} \langle \text{nyinkagin} \rangle \\ \text{VALENCE} \left[\begin{array}{l} \text{SUBJ} \langle \underline{1} \rangle \\ \text{COMPS} \langle \underline{2} \rangle \end{array} \right] \\ \text{ARG-S} \langle \underline{1}\text{NP}_i, \underline{2}\text{NP}_j \rangle \\ \text{CONTENT} \left[\begin{array}{l} \textit{seeing-rel} \\ \text{SEER } i \\ \text{SEEN } j \end{array} \right] \end{array} \right]$ | $\left[\begin{array}{l} \text{PHON} \langle \text{cinkagin} \rangle \\ \text{VALENCE} \left[\begin{array}{l} \text{SUBJ} \langle \underline{2} \rangle \\ \text{COMPS} \langle \underline{1} \rangle \end{array} \right] \\ \text{ARG-S} \langle \underline{1}\text{NP}_i, \underline{2}\text{NP}_j \rangle \\ \text{CONTENT} \left[\begin{array}{l} \textit{seeing-rel} \\ \text{SEER } i \\ \text{SEEN } j \end{array} \right] \end{array} \right]$ |
|---|--|

In addition to the AV/OV forms, Balinese has a passive construction, with optional agent by-phrase. Assuming the standard analysis of passive as a shuffling of the ARG-S list, the passive agent is more oblique than its coarguments. This predicts that binding facts will differ for OV (where the Agent is the leftmost in ARG-S) and passive clauses, respectively. This prediction is confirmed for Balinese, but this will not be presented here for lack of space (see Wechsler and Arka, 1998).

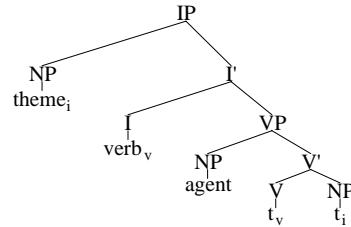
To sum up this section, we have analyzed the Balinese voice morphology as regulating the mapping between the ARG-S list and the VALENCE lists. On this view ARG-S is invariant across OV and AV voices. This explains why binding appears not to depend on grammatical function (subject, etc.). Next we look at a GB analysis of the same facts.

4. GB Analysis

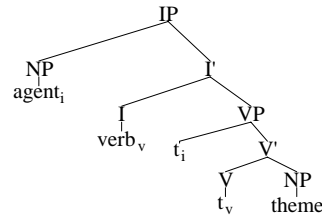
To our knowledge GB theory has not been applied to Balinese (except Travis 1997; see Section 7 below). The following analysis essentially follows the account of Austronesian voice-marking in (Guilfoyle, Hung, and Travis, 1992) (hereafter 'GHT'), which is based on data from Tagalog, Indonesian, and Malagasy. Numerous more recent studies of Austronesian have the same general structure (see, e.g. Bittner and Hale, 1996), and my comments apply equally to all of them that I am familiar with.

As in much recent GB work, GHT assume that all theta-roles are discharged within the VP. Their [Spec,IP] position, to which an argument sometimes moves for Case, corresponds to our 'subject', the single element of the SUBJ list. Applying this theory to Balinese, syntactically ergative (OV) or accusative (AV) clauses would be generated by moving the theme or agent, respectively, into [Spec,IP]. In either case, the verb moves to Infl:

(12) a. OV clause:



b. AV clause:



Now consider binding. GB binding theory is based on configurational relations defined on phrase structure representations. Specifically, given two constituents x and y , x a-binds y iff x is in an A-position (argument position), x and y are coindexed, and x c-commands y . The set of items in A-positions (in GB) roughly corresponds to the set of items in our ARG-S list (in HPSG), and the relative c-command relations holding between those items (in GB) corresponds to the ordering on the elements in ARG-S, namely a-command (in HPSG). Thus a crucial issue for any GB account of binding is just which phrase structure positions are assumed to be A-positions.

GHT do not investigate binding in detail, but they note that binding in the Austronesian languages they consider appears to be ‘theta sensitive’ in that, e.g., ‘Agents are always possible antecedents of reflexives.’ (p. 392). They suggest that their analysis makes available a structural account of binding (p. 392). Given the binding facts, GHT must assume that the set of A-positions are the VP-internal positions, while [Spec,IP] is an A-bar position (non-A-position). On that assumption, in both (12)a and b, the highest A-position in the agent chain (namely Spec,VP) c-commands the highest A-position in the theme chain (namely the complement of V). This gives the desired result: the agent asymmetrically binds the theme regardless of which one is subject. In other words, since binding depends on A-positions, we effectively abstract away from the effects of A-bar movement, returning each argument to the highest A-position in its chain.

Now let us compare the two representations of the voice-marking alternation, in HPSG (11) and GB (12). There are clear parallels. In both frameworks the arguments are hierarchically organized for the purpose of various processes such as anaphoric binding, whether represented by ARG-S list or by the set of A-positions arranged in a hierarchical phrase structure. Subjecthood of an argument is represented by structure-sharing with the SUBJ item or by movement into the subject position (Spec,IP). The correspondences are summarized here:

- | | | |
|------|---------------------------|------------------------------------|
| (13) | <u>HPSG</u> | <u>GB</u> |
| | ARG-S list items | items in A-positions ('arguments') |
| | a-command | c-command (between A-positions) |
| | structure-sharing w/ SUBJ | movement to Spec,IP |

There are also important differences between the respective representations. Empirical differences between binding theories based on a-command and c-command have been discussed extensively elsewhere (Bresnan, 1995; Pollard and Sag, 1992). Also, the tree structure representation of hierarchy is considerably richer than the list representation, begging the question of whether that added richness is ever linguistically relevant. Does the grammar ever appeal to any properties of the VP in (12), other than the fact that the agent c-commands the theme? For example, does it matter that the V' is a constituent; V and its object are sisters; V' and its specifier are sisters; and so on? If not, then by Occam's Razor it should be abandoned in favor of the list representation.

Apart from suffering from this 'embarrass de richesse', the GB analysis appears to be substantially similar to that of HPSG. However, this apparent similarity turns out to be illusory, as we will see when we expand our coverage to include raising constructions.

5. Raising

Balinese has many subject-to-subject raising (SSR) and subject-to-object raising (SOR) predicates. These allow raising only of the downstairs subject (as noted by Artawa 1994). Consider embedded transitive verbs, first an OV verb (14):

- (14) a. *Ngenah sajan [kapelihan-ne engkebang ci].*
 seem much mistake-3POSS OV.hide 2nd
 It is very apparent that you are hiding his/her wrongdoing.
- b. *Kapelihan-ne ngenah sajan engkebang ci.*
 mistake-3POSS seem much OV.hide 2nd
- c. *?*ci ngenah sajan kapelihan-ne engkebang.*
 2nd seem much mistake-3POSS OV.hide

In the non-raised example (14)a the bracketed clause is the complement of the predicate *ngenah* 'seem'/'apparent'. Since the embedded verb *engkebang* 'hide' is in OV form, its theme *kapelihan-ne* 'his/her mistake' is the subject and its agent *ci* 'you' is object. Being the embedded subject, the theme *kapelihan-ne* can be raised, as shown in (14)b, while the embedded agent *ci*, being a non-subject, cannot raise, as shown in (14)c.

When the embedded verb *ngengkebang* ‘hide’ appears in its AV form, the arguments are reversed from (14)a. Now the agent *ci* is the embedded subject and theme *kapelihan-ne* is the object:

- (15) a. ngenah sajan [ci ngengkebang kapelihan-ne].
 seem much 2nd AV.hide mistake-3POSS
 It is very apparent that you are hiding his/her wrongdoing.
- b. Ci ngenah sajan ngengkebang kapelihan-ne.
 2nd seem much AV.hide mistake-3POSS
- c. ?*Kapelihan-ne ngenah sajan ci ngengkebang.
 mistake-3POSS seem much 2nd AV.hide

As expected, the embedded agent *ci*, being the subject, can raise (as in (15)b), while the theme *kapelihan-ne*, being a non-subject, cannot raise (as in (15)c).

Now consider the Balinese SOR construction (example from Artawa, 1994, p. 148):

- (16)a. Nyoman Santosa tawang tiang mulih.
 (name) OV.know 1st go.home
 I knew that Nyoman Santosa went home.
- b. Tiang nawang Nyoman Santosa mulih.
 1st AV-know (name) go.home
 I knew that Nyoman Santosa went home.

The SOR verb *tawang* ‘know’ is transitive, hence participates in the OV/AV voice alternation. Specifically, the ‘raised’ NP appears in the subject position of an OV SOR verb (as in (16)a) or object position of an AV SOR verb (as in (16)b). (In that sense ‘subject-to-object raising’ is a misnomer; rather it involves, so to speak, ‘raising to A-object’, i.e. to the second position in ARG-S.) This alternation follows from our account of voice-marking, assuming that the ‘raised’ NP and the following open complement (here, the predicate *mulih* ‘go home’) are both complements of the matrix verb (Pollard and Sag, 1994, ch. 3). The verb *tawang* ‘know’ has the following ARG-S list and semantic content:

(17) *tawang*:

$$\left[\begin{array}{l} \text{ARG-S} < \text{NP}_i, [2]\text{NP}, \text{VP}[\text{SUBJ} < [2] >]: j > \\ \text{CONTENT} \left[\begin{array}{ll} \textit{know-relation} & \\ \text{KNOWER} & i \\ \text{PROPOSITION} & j \end{array} \right] \end{array} \right]$$

From the linking rules in (8) we see that when the SOR verb appears in OV voice a non-A-subject term must be the subject; the only element qualifying for subject is the second item in ARG-S, [2]NP. The result is (16)a. In AV voice the A-subject is the subject, yielding (16)b.

As with SSR, only the lower subject can raise into the higher clause in the SOR construction. This generalization obtains for all four combinations of AV and OV on the matrix and embedded predicates, but space does not allow for presentation of the relevant data (see Wechsler and Arka, 1998).

6. Binding in Raising Constructions

Now consider binding in raising constructions. As in English, the Balinese SSR verb meaning ‘seem’ optionally takes a PP complement to express the agent. In Balinese (19), as in English (18), the raised NP can bind a reflexive in the PP, and cannot bind a pronominal in that position.

(18) I wonder whether he_i seems to {himself_i / him*_i} to be ugly.

(19) Takonang tiang apa ia_i ngenah sig {awakne_i / ia*_i} jelek sajan.
 OV.ask 1st Q 3rd seem to self bad very
 I asked (him) whether he seemed to himself/him to be very ugly.

In HPSG these facts follow from the ARG-S for *ngengah* ‘seem’, in which the raised NP a-commands the PP:

(20) *ngengah*:

$$\left[\begin{array}{l} \text{ARG-S} < \boxed{1}\text{NP}_i, \text{PP}[\text{sig}]:\text{ana}_i/\text{ppro}_{*i}, \text{VP}[\text{SUBJ} < \boxed{1} >]: j > \\ \text{CONTENT} \textit{seem}(i, j) \end{array} \right]$$

The raised NP can alternatively bind an embedded NP complement reflexive which it a-commands on the downstairs ARG-S list:

(21) a. Ia_i ngenah pesan sig cange ngajum-ngajum awakne_i / ia*_i
 3rd seem very to me AV.boast-boast self

He_i seems to me to boast of himself_i /him*_i

b. ARG-S lists for (21)a

$$\left[\begin{array}{l} \text{'seem': } \langle \boxed{\text{I}}\text{NP, PP, VP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'AV.boast': } \langle \boxed{\text{I}}\text{NP}_i, \text{NP:} \textit{ana}_i / \textit{ppro}_{*i} \rangle \end{array} \right]$$

The ARG-S lists for *ngengah* 'seem' and *ngajum-ngajum* 'AV.boast', as they occur in example (21)a, are shown in (21)b. Here and in subsequent diagrams, the tags indicate structure-sharing between elements in the respective ARG-S lists when these words occur in the relevant sentence.

If the embedded predicate is in OV form, then the embedded agent can bind a raised reflexive:

(22)a. Awakne_i ngenah pesan sig cange ajum-ajum=a_i
 self seem very to me OV.boast-boast=3
 He_i seems to me to boast of himself_i

b. ARG-S lists for (22)a

$$\left[\begin{array}{l} \text{'seem': } \langle \boxed{\text{I}}\text{NP, PP}[\textit{sig}], \text{VP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'OV.boast': } \langle \text{NP}_i, \boxed{\text{I}}\text{NP:} \textit{ana}_i \rangle \end{array} \right]$$

Note that binding in this case takes place on the ARG-S list for the embedded predicate *ajum-ajum* 'OV.boast', although the bound anaphor is raised into the matrix subject position.

Unlike SSR verbs, SOR verbs are transitive so they exhibit the OV/AV alternation, leading to further complication. But these facts also follow directly from our theory. As shown in (17) above, the agent ('knower') argument of 'know' a-commands the raised NP. We predict that the agent can bind a raised reflexive but not a raised pronoun. This is confirmed for 'think' in its AV form ((23)a) and OV form ((23)b):

(23) a. Cang ngaden {awak cange/*cang} suba mati.
 1sg AV.think myself / *me already dead
 I believed myself/*me to be dead already.

- b. {Awak cange/*cang kaden cang suba mati.
 myself/*me OV.think 1sg already dead
 I believed myself/*me to be dead already.

- c. ARG-S lists for examples (23)a,b

$$\left[\begin{array}{l} \text{'AV/OV.think': } \langle \text{NP}_i, \boxed{\text{NP:ana}_i/\text{ppro}_{*i}}, \text{XP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'dead': } \langle \boxed{\text{NP}} \rangle \end{array} \right]$$

Since voice marking on the matrix verb does not affect ARG-S list, we can collapse (23)a and b into one diagram, shown in (23)c.

In (24) the embedded transitive verb is OV, so the theme is the subject which is raised. As in the previous example, a raised reflexive argument can be bound by the upstairs agent while a raised pronoun cannot be (irrespective of whether the SOR verb is AV as in (24)a or OV as in (24)b):

- (24) a. Ia_i nawang {awakne_i / ia*_i} lakar tangkep polisi.
 3rd AV.know self/ 3rd FUT OV.arrest police

- b. {Awakne_i / *Ia_i} tawang=a_i lakar tangkep polisi.
 self / 3rd OV.know=3 FUT OV.arrest police
 He_i knew that the police would arrest self_i./him*_i.

- c. ARG-S lists for examples (24)a,b

$$\left[\begin{array}{l} \text{'AV/OV.know': } \langle \text{NP}_i, \boxed{\text{NP:ana}_i/\text{ppro}_{*i}}, \text{VP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'OV.arrest': } \langle \text{NP}, \boxed{\text{NP}} \rangle \end{array} \right]$$

The preceding examples illustrate binding on the matrix ARG-S list. The raised argument can alternatively participate in binding relations with its semantic coarguments on the embedded ARG-S list. In (25) the raised argument (*ia*) binds the downstairs reflexive (*awakne*) but not a pronoun, regardless of whether the matrix verb is AV (placing the raised argument in object position, as in (25)a) or OV (placing the raised argument in subject position, as in (25)b).

- (25) a. Cang ngaden ia_i suba ningalin awakne_i/ ia*_i
 1sg AV.think 3rd already AV.see self / 3rd
 I believe him_i to have seen himself_i / him*_i.
- b. Ia_i kaden cang suba ningalin awakne_i / ia*_i
 3rd OV.think 1sg already AV.see self
 I believe him to have seen himself.
- c. ARG-S lists for examples (25)a,b

$$\left[\begin{array}{l} \text{'AV/OV.think': } \langle \text{NP, } \boxed{\text{INP}}_i, \text{VP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'AV.see': } \langle \boxed{\text{INP}}, \text{NP:} \textit{ana}_i / \textit{ppro}_{s_i} \rangle \end{array} \right]$$

Or the raised argument can be bound on the downstairs ARG-S, as in (26):

- (26) a. Cang ngaden awakne_i suba tingalin=a_i.
 1sg AV.think self_i already OV.see=3
 I believe him to have seen himself.
- b. Awakne_i kaden cang suba tingalin=a_i.
 self_i OV.think 1sg already OV.see=3
 I believe him to have seen himself.
- c. ARG-S lists for examples (26)a,b

$$\left[\begin{array}{l} \text{'AV/OV.think': } \langle \text{NP, } \boxed{\text{INP}}, \text{VP}[\text{SUBJ } \langle \boxed{\text{I}} \rangle] \rangle \\ \text{'AV.see': } \langle \text{NP}_i, \boxed{\text{INP}}:\textit{ana}_i \rangle \end{array} \right]$$

The raised reflexive *awakne* is bound by the downstairs agent, the clitic =a.

Examples (24), (25), and (26) point up a slight vagueness in the interpretation of HPSG binding theory, which must be resolved. If, due to raising, an anaphor is simultaneously a-commanded on two ARG-S lists, must it be bound on both lists, or is one sufficient? Must a pronoun in this situation be free on both lists? Since an anaphor needs only one antecedent, it would be illogical to expect it to be bound on more than one ARG-S list, so we adopt an 'existential' interpretation of Principle A: An a-commanded

anaphor must be locally a-bound on *some* ARG-S list (we call this ‘Principle A_{\exists} ’; the universal version will be designated ‘Principle A_{\forall} ’). On the other hand, Principle B dictates the obviation domain for pronouns, so we take the strongest (‘universal quantification’) interpretation of Principle B: a pronominal must be locally a-free in all ARG-S lists in which the pronominal appears. To put it differently: An anaphor satisfies Principle A if it is locally a-bound (on any list); a pronoun violates Principle B if it is locally a-bound (on any list).

This interpretation gives the correct results for Balinese. For example, the anaphor in (26) is a-bound only on the ARG-S list for ‘see’, and not on the list for ‘think’.

An anonymous reviewer has suggested that certain facts involving clitic climbing in French causative constructions cast doubt on the universality of Principle A_{\exists} . The reviewer notes that the ungrammaticality of the following example could be explained by assuming the universal interpretation instead.

- (27) *Jean se fera pincer à Marie.
 Jean REFL make-fut pinch to Marie

The sentence is ill-formed on either construal of the reflexive clitic: ‘Jean will make Marie pinch Jean’ or ‘Jean will make Marie pinch herself.’ French clitic climbing (the appearance of certain clitics on a higher verb than the one subcategorizing them) has been analyzed in HPSG in terms of argument composition (cp. ‘clause union’, ‘argument attraction’): through its lexical specification the causative verb *faire*, in effect, ‘attracts’ the arguments of its complement infinitive verb onto its own ARG-S list (Abeillé, Godard, and Sag, to appear). In (27) the clitic *se* would be commanded on two lists, those of *faire* and *pincer*:

- (28) ARG-S lists for ex. (27)

$$\left[\begin{array}{l} \text{faire: } \langle \text{'Jean'}, \boxed{1} \text{se, 'faire', 'à Marie'}_i \rangle \\ \text{pincer: } \langle \text{NP}_i, \boxed{1} \rangle \end{array} \right]$$

Assuming Principle A_{\forall} (instead of A_{\exists} , as assumed here) such examples are ruled out since the reflexive cannot possibly be bound on both lists (this would entail that Jean and Marie are coreferential).

While the explanation for (27) is clearly outside the scope of the present paper, it should be noted that there are problems with the reviewer’s proposal (there is currently no definitive analysis of this specific point by the HPSG ‘French group’, according to Ivan Sag (personal communication, Feb. 27, 1998)). First of all, non-third person clitics resist climbing regardless of whether they are reflexive or not (Hyman and Zimmer, 1976; Koenig, 1994):

- (29) *Marc m'a fait raccompagner à Jacques.
 Marc Ip'aux make bring.back to Jacques
 'Marc made Jacques bring me back.'

This suggests that the explanation for (27) may be unrelated to anaphoric binding (as indeed Koenig (1994) argues). Also some dialects allow se-climbing as in (27); see (Koenig, 1994, p.314) for attested examples from texts.

In any case it is important to understand that the universal/existential issue, while interesting, is completely orthogonal to the point being made in this paper. My argument does not rest on a claim to universality for the binding rules given here; indeed, it is well-known that binding systems vary across languages (Dalrymple, 1993, *inter alia*). Rather, the purpose of this paper is to compare HPSG and GB approaches to binding in Balinese. The problems which Balinese raising constructions pose for GB binding theory are deeper, and would not be ameliorated by either an existential or universal interpretation of (GB) Principle A. This is shown in the following section.

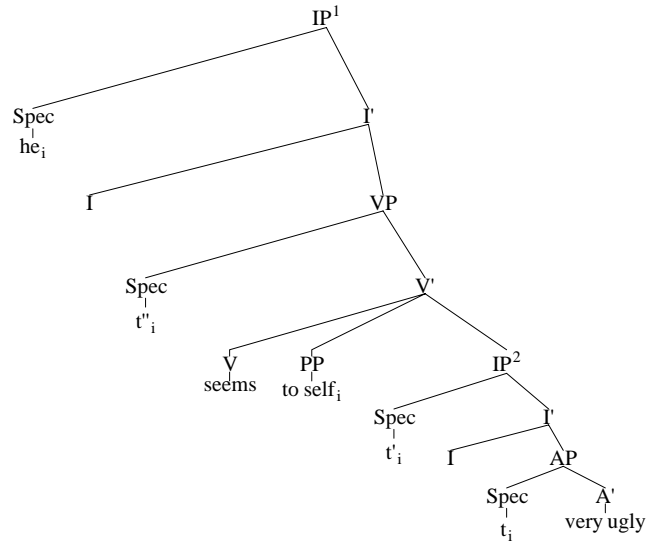
7. Implications of Raising for the GB analysis

Crucial to any GB account of binding is the designation of which positions are A-positions and which are A-bar positions. In GB terms we have demonstrated in the previous section that the raised NP acts, for purposes of binding within the matrix clause, as if it is in an A-position. For example, the raised subject in (19) can bind the matrix PP.

Hence the matrix Spec,VP and/or Spec,IP¹ position in (30) below is necessarily an A-position.⁴ This follows because the anaphor *awakne* must be a-bound, that is, coindexed with a c-commander in an A-position. Now consider the status of the lower subject position, that is, the [Spec,IP²] position in (30). Normally one would assume that the raised item has passed through the [Spec,IP²], as indicated by the trace *t'_i* in (30). This assumption is needed in order to capture the generalization that only subjects can be raised. Movement from A-bar position to A-position is prohibited as improper movement (it is technically ruled out because of improper A-binding of the variable in the [Spec,IP²] position). From this we deduce that [Spec,IP²] is necessarily an A-position.

⁴Various modifications of the structure in (30) are imaginable: having the moved element skip Spec,VP; positing different functional projections; eliminating ternary branching, and so on. As far as I can tell they would have no effect on our argument.

(30)



However, as explained in Section 4 above, that subject position ($Spec,IP$) must be an A-bar position if we are to account for binding in simplex clauses (see example (9)/(12) above). This leads to a contradiction: for the purpose of binding by a raised argument in the higher clause, the lower subject position must be an A-position, while for binding in a simplex clause that same position must be an A-bar position. This contradiction arises regardless of what precise position we assume as the landing site for movement in SSR and SOR constructions (e.g. [$Spec,AgrO$] in the latter case).

This paradox, which I call ‘the Balinese bind’, goes to the heart of the GB binding theory and cannot, to my knowledge, be solved with a simple technical fix. In particular, let us try universal and existential versions of Principle A, as discussed in the previous section. In (30) the anaphor does not move, so the existential/universal distinction has no effect; on either version $Spec,IP$ must be an A-position to allow this sentence. So let us designate $Spec,IP$ as an A-position, thus solving (19)/(30), and consider simplex clauses. GB Principle A_{\forall} (every link in an anaphor chain must be A-bound in a local domain) cannot be right, as it would incorrectly rule out simple transitive OV sentences like (9b)/(12a), since the head of the anaphor chain is not A-bound. Now try GB Principle A_{\exists} : some link in an anaphor chain must be bound in a local domain. This seems to solve the problem now for (9b)/(12a): the *trace* of the reflexive is bound, in accord with Principle A. But now other problems arise. First, the reflexive in (9b), now assumed to be in an A-position, improperly binds the pronoun, a

Principle B violation. Moreover, exchanging the pronoun and reflexive in (9b) (but maintaining the OV verb form) is predicted to produce a good sentence, since the reflexive, now in [Spec,VP], would be bound by the pronoun in [Spec,IP]. But in fact such a sentence is impossible.

In spring 1997 Lisa Travis became aware of our Balinese data, and discovered that a similar problem arises for Malagasy raising. Travis (1997) outlines possible foundational changes to GB binding theory which would address this problem. Travis' proposal involves (at least) the following innovations: (i) binding is based on theta-positions instead of A-positions; (ii) certain functional heads assign an abstract theta role to their Spec positions 'in the syntax'; and (iii) an argument may move into such a theta-marked Spec position (despite the theta-criterion). In this way the raised position (cp. [Spec, IP¹] in (30)) becomes a theta-position so the raised argument can bind the reflexive. It is beyond the scope of this paper to assess this proposal. The present point is rather that the new proposal, in contrast to (Guilfoyle, Hung, and Travis, 1992), no longer has any apparent parallels to the present HPSG analysis. Indeed, as far as I can tell, the HPSG analysis presented above cannot be 'translated' into GB in any straightforward fashion.

8. Conclusion

It is commonplace in some circles to trivialize apparently minor (or so-called 'notational') differences between comparable analyses in different frameworks. The case of the 'Balinese bind' illustrates the fallacy of this practice.

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